SANTA CLARA VALLEY WATER DISTRICT

URBAN WATER MANAGEMENT PLAN

April 2001

SANTA CLARA VALLEY WATER DISTRICT

URBAN WATER MANAGEMENT PLAN

Prepared by

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APRIL 2001

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Chapter 1
Introduction

This chapter describes the requirements and purpose of the Urban Water Management Planning Act (Act) and the contents, implementation schedule and coordination and review process for this document.

A. The Urban Water Management Planning Act

This Urban Water Management Plan (UWMP) has been prepared in response to the California Urban Water Management Planning Act (Act), Water Code Division 6, Part 2.6, Sections 10610 through 10656.

The Act recognizes that although the efficient use of water supplies is a statewide concern, the planning and implementation of that use can best be accomplished at the local level. To this end, the Act requires publicly and privately owned urban water suppliers to prepare and adopt an UWMP every 5 years. Urban water suppliers are defined as those who provide water for municipal purposes either directly or indirectly to more than 3,000 customers, or who supply more than 3,000 acre-feet (af) of water annually.

The Act requires that UWMPs describe suppliers' service area, water use by customer class, water supply and demand, water service reliability and shortage response options, water transfer and exchange opportunities, water recycling efforts, and conservation measures. The legislation and a summary of its amendments are included in Appendix A.

B. The Santa Clara Valley Water District's 2000 Urban Water Management Plan

As the wholesale water supplier for all of Santa Clara County, supplying more than 3,000 af of urban water annually, the Santa Clara Valley Water District (District) is required to prepare an UWMP. The District prepared an UWMP in 1985 and revisions in 1990 and 1995 for both District and regional water supply planning purposes. This UWMP represents a revision of those earlier documents.

Chapter contents are described below. The provisions of the Act that correspond to various chapters are noted in parentheses.

Chapter 1	Introduction: This chapter describes the UWMP requirements and purpose as per the Act, and includes the UWMP implementation schedule and the coordination and review process. (10642, 10643, 10644, 10645)
Chapter 2	District Profile: This chapter describes the District and its service area, including

	the geography and climate of the Santa Clara County (the County), the water history of the area, the history and formation of the District, and the District's water management policies and goals. (10631a)
Chapter 3	The Water Supply System: This chapter describes the District's water supply, treatment, and distribution facilities, including local reservoirs, the groundwater basin, imported supply facilities, raw water conveyance facilities, and the water treatment and distribution system. The District's role as a water wholesaler is also presented, and the County's water retail agencies and their current water demands are identified. (10631a)
Chapter 4	Water Use: This chapter describes the demographics and economy of the County, current and projected. The projected water demand to the year 2020 is presented, including a description of the District's demand planning range and the methods behind these projections. Past and current water use are identified, including an estimate of water use by different customer segments. (10631a, 10631e)
Chapter 5	Water Supply Outlook: This chapter examines the water supply outlook in the County under different hydrologic conditions. It presents the amount of water available from existing local and imported supplies, including improvements to supply and supply reliability. (10631b, c, 10635a)
Chapter 6	Water Supply Deficiencies and Risks: This chapter describes the ability of the County's water supplies to meet needs during the District's Critical Dry Period and other times of water shortage. The chapter also describes other risks and uncertainties in the water supply outlook, and identifies District activities to reduce uncertainties and risk. (10631c)
Chapter 7	Contingency Planning: This chapter describes the District's contingency planning for actions that can be taken should shortage occur. A strategy for early drought recognition and response is presented, and shortage response levels and stages of action are described. (10632)
Chapter 8	Water Recycling Opportunities: This chapter describes current and proposed recycling programs in the County, including the South Bay Water Recycling Program, the Sunnyvale Water Recycling project, the South County Regional Wastewater Authority activities, and the Palo Alto Recycling Project. Opportunities in non-potable and potable recycled water projects are discussed, including the Bay Area Regional Water Recycling Program. (10632a, 10633)
Chapter 9	Water Banking Opportunities: This chapter describes the District's current water banking activities, such as participation in the Semitropic Groundwater Banking and Exchange Program, and the potential for additional banking opportunities. (10631d)

Chapter 10	Water Transfer Opportunities: This chapter describes the District's water exchange activities. Opportunities for water transfer agreements are also discussed. (10631d)
Chapter 11	Water Conservation: This chapter describes the District's water conservation program and presents estimated water savings.
Appendices	Appendix A: Urban Water Management Planning Act Appendix B: District Water Planning and Management Activities Appendix C: List of Contact Persons

C. The Integrated Water Resources Plan and UWMP Implementation Schedule

The majority of the actions described in this UWMP are being implemented as part of the District's Integrated Water Resources Plan (IWRP) Preferred Strategy. The preferred strategy guides the District's water resource planning through year 2020. It was designed for optimum flexibility to meet changing conditions and demands over time through staged review, development, and implementation of four key components: water banking, long-term water transfers, recycled water, and water conservation. Implementation of the preferred strategy will occur in response to demand, as depicted in Figure 1-1.

Figure 1-1
IWRP Preferred Strategy

Minimum		Continue Implementation of Core Elements	Continue Implementation of Core Elements	Continue Implementation of Core Elements	Continue Implementation of Core Elements	Minimum Shortage Level (0 af)
Intermediate Action	Begin 100,000 af Water Banking	11,000 af Additional Water Conservation		No Additional Actions	No Additional Actions	Intermediate Shortage Level (50,000 af)
	Partner in Water Recycling*		25,000 af Transfers or Water Recycling			
	Core Elements	Core Elements	Core Elements	Core Elements	Core Elements	
Maximum Action		25,000 af Long-Term Transfers and/or Water Recycling	Additional Water Banking 100,000-350,000 af	25,000 af Long-Term Transfers	No Additional Actions	Maximum Shortage Level (100,000 af)
		11,000 af Additional Water Conservation				
		Core Elements	Core Elements	Core Elements	Core Elements	

1997 2000 2005 2010 2015 2020

* Minimum of 6,000 af from infill; additional recycling potential to be pursued jointly with wastewater agencies.

The preferred strategy outlines three action levels: minimum, intermediate, and maximum. These levels correspond to a range of potential future shortages. The District is currently pursuing the intermediate action level until projected supply or demand conditions change, indicating that either the minimum or maximum action level is more appropriate. Periodic updates are scheduled as part of the IWRP process to determine the accuracy of water demand projections and the reliability of existing supplies.

Some actions described in this UWMP are considered "core elements" of the preferred strategy. These are activities that will: 1) ensure the validity of the baseline assumptions employed during the IWRP process; 2) monitor or evaluate resource options; or 3) help meet IWRP planning objectives. The core elements are listed in Figure 1-2.

Figure 1-2
IWRP Core Elements

Actions to Ensure Validity of Baseline Assumptions

- Achieve 46,000 af/year of water conservation by year 2020 (not including additional conservation adopted as part of the IWRP Preferred Strategy).
- Achieve 14,400 af/year non-potable recycling (not including additional recycling adopted as part of the IWRP Preferred Strategy).
- Establish an M&I shortage policy for CVP supplies.
- Protect reliability of SWP, CVP and Hetch-Hetchy supplies.
- Protect existing resources and monitor potential impacts.
- Implement programs to seek improvements in source water quality, protect quality of existing resources, and improve treatment capability.
- Improve data collection and evaluation.
- Expand and upgrade Rinconada WTP from 80 to 100 million gallons per day (mgd) to meet anticipated capacity requirements.
- Add recharge and/or treatment capacity for South County.

Actions to Monitor and Evaluate Resource Options

- Investigate water marketing opportunities.
- Investigate future storage options.
- Investigate increased recycling opportunities and distribution of costs and benefits.
- Investigate opportunities to improve reliability of imported water supplies.
- Investigate other resource options that have been held for future consideration.

Actions to Help Meet Objectives

- Assess system vulnerability.
- Continue public interaction.
- Investigate system re-operation to improve efficiency.

When the District's Board accepted the IWRP Preferred Strategy in December of 1996, staff began immediately to implement the intermediate action program. Actions included:

- Continuing implementation of the core elements, including establishing an M&I Shortage Policy for CVP supplies.
- Expansion of a water banking agreement with Semitropic Water Storage District.
- Development of water recycling partnerships and changes to the District's water recycling policy to allow for increased financial participation.
- Board approval of nine guidelines to follow in pursuing future water transfer opportunities.

The implementation schedule for these and other District water supply planning activities is described below.

1. Implementation of Water Banking

The Board has adopted interim guidelines to be used by staff in developing water banking opportunities. These guidelines favor programs that are structurally, operationally, institutionally, environmentally, and economically feasible; are legally secure; are operated by qualified management; provide operational and participation flexibility; allow for beneficial partnerships with other agencies; have timelines for development that meet District needs; and improve the overall benefits to the County.

In April of 1997, the District also entered a long-term water banking agreement with the Semitropic Water Storage District that reserves 35 percent, or 350,000 af, of storage in the banking program. The District has until January 1, 2006 to finalize its level of participation in the program. The term of the Semitropic agreement is until the year 2035. The District now has almost 142,000 af stored in the program. The District can withdraw up to 31,500 af annually from the bank during dry periods.

The District continues to pursue and evaluate other potential banking programs. Since banking implementation depends on external factors and other agencies, the District must remain flexible enough to respond to banking opportunities as they arise.

2. Implementation of Recycled Water

Over the next 2 years, the District plans to continue to develop a partnership role with the cities and ensure that all decisions being made now for recycled water systems take into account the need for recycled water as a major component of the long-term water supply. In the short term, this means becoming more involved with the City of San Jose as it implements the South Bay Water Recycling Phase II program and as it makes incremental additions to the Phase I pipeline network. In 1999**,** formal agreements with the South County Regional Wastewater Authority and the City of Gilroy were executed to expand the District's South County recycled water system. Continued support of the Sunnyvale program will be maintained and monitoring of the Palo Alto program will continue. Coordination with the Bay Area Regional Water Recycling Program is ongoing.

3. Implementation of Water Conservation

The District's water conservation program began in 1991. The District's program has been developed in large part to comply with the BMP commitments, as defined in the Memorandum of Understanding Regarding Urban Water Conservation in California. The program elements target residential, commercial/industrial, and agricultural water use. The program is a regional approach on behalf of the District's water retailers, and several of these elements have been developed in partnership with local retail water suppliers and the City of San Jose.

4. Implementation of Water Transfers

On February 17, 1998 the District's Board adopted guidelines to be used by staff in developing transfer opportunities, identifying a preference for Delta export area sources and for transfers that:

- Are operationally, institutionally, environmentally, and economically feasible.
- Improve imported water quality.
- Provide multiple benefits.
- Allow for beneficial partnerships with other agencies.
- Improve the overall benefits to the County.

In 1998, the District and two other agencies (Pajaro Valley Water Management Agency and Westlands Water District) jointly participated in the permanent assignment of 6,260 af from Mercy Springs Water District, an agricultural Central Valley Project (CVP) contractor. Under the agreement, the District has an option for dry-year supplies totaling at least 20,000 af over a 20-year period. The dry-year option may continue for subsequent terms depending on the future plans of Pajaro Valley Water Management Agency. This small transfer gave the District some experience in creating partnerships and obtaining institutional approvals.

The District continues to carry out operational exchanges with other CVP contractors to maximize efficient use of contractual supplies. For a number of years the District has exchanged up to 16,000 af with San Benito County Water District, taking advantage of differences in a contract year to hedge against shortages in the following year.

The preferred strategy intermediate action level indicates that the need for transfers would not occur until 2005 to 2010. Because of the IWRP timeline for water transfers, the District has not actively solicited transfers from interested parties. However, the District does consider and evaluate transfer opportunities as they become available.

5. Implementation of Other Water Supply Planning Activities

Figure 1-3 summarizes the water supply and planning activities that support the IWRP implementation and other District programs.

Figure 1-3
Summary of Water Supply and Planning Activity Implementation

Program/Study	**Purpose**	**Duration/ Completion**
Water Demand Projection Update	Update the District's water demand projections through 2020.	2000
General Groundwater Quality Monitoring Program	Evaluate the status of groundwater quality and highlight areas of concern.	Ongoing
The Solvents and Toxics Cleanup Liaison Program	Provide review of solvent and other contaminant cases to verify that appropriate and expeditious cleanup is occurring.	Ongoing
Leaking Underground Storage Tank Oversight Program	Oversee the investigation and cleanup of cases where soil or groundwater has been affected by petroleum fuel, and additives such as MTBE from leaking underground storage tanks.	Ongoing
Nitrate Management Program	Reduce nitrate contamination and exposure through education and monitoring.	Ongoing
Groundwater Assessment and Protection Program	Assess groundwater vulnerability to pollution and implement management programs, i.e. MTBE Drinking Water Protection Program.	Ongoing
Groundwater Basin Management Programs	Document the County's groundwater resources management practices.	2000
System Vulnerability Assessment	Analyze the vulnerability of District facilities under various emergency or disaster scenarios.	2002
Expansion of Rinconada Water Treatment Plant	Enhance water supply in the west side of the North County.	2001-2003
Investigate capturing Additional Local Streamflow at Uvas Reservoir	Enhance and maximize local water supply in District's service area.	2003
Comprehensive Reservoir Watershed Management Project	Assess water quality conditions in the reservoir watersheds and develop mitigation measures for water quality problems.	2002
Monitoring Surface Storage Options	Monitor opportunities for additional surface storage of imported and local water during wet years.	Ongoing

D. UWMP Development and Review Process

This UWMP was prepared by District staff, many of whom work closely with retail water agencies, advisory committees, and others to develop and implement water management and conservation programs. These programs are described in detail in Appendix B. A list of Contact People for questions concerning this report appears in Appendix C.

A draft of the UWMP was made available for public review in the office of the District's Clerk of the Board and at the Willow Glen Library. Drafts of the Plan were also sent to the District's water retailers and the city and county planning departments for their review. A public hearing was conducted on April 3rd and the District Board of Directors (Board) passed a resolution recommending that the UWMP be adopted, with minor revisions. No public comments were received. This UWMP was then filed with the California Department of Water Resources.

This development and review process complies with Sections 10641, 10642, and 10644 of the Act.

Chapter 2
District Profile

This chapter describes the District and its service area, including the geography and climate of the County, the water history of the area, the history and formation of the District, and the District's water management policies and goals.

A. Geography

The District is a special district created by the State legislature to be responsible for water supply, flood protection, and watershed management in Santa Clara County, the southernmost county bordering the San Francisco Bay. The District has the same boundaries as the County, covering about 1,300 square miles. The Santa Clara Valley runs the entire length of the County from north to south, bounded by the Diablo Range to the east and the Santa Cruz Mountains to the west. The valley is bounded to the northwest by the southern reaches of San Francisco Bay and to the south by the Pajaro River.

Santa Clara County is unique because of its combination of physical attractiveness and economic diversity. It is the largest of the Bay Area counties and contributes more than one fourth of the total population and jobs in the Bay Area. Most development and water use occurs on the 350-square-mile valley floor.

The northern part of the valley, north of the Coyote Narrows, is extensively urbanized and houses over 90 percent of the County's 1.7 million residents and 13 of the County's 15 cities. The southern part of the valley remains predominately rural with some low-density residential development, with the exception of the cities of Morgan Hill and Gilroy.

B. Climate

The valley's Mediterranean semi-arid climate is temperate year-round, with warm and dry weather lasting from late spring through early fall. Average annual precipitation ranges from 13 inches on the valley floor to 45 inches along the crest of the Santa Cruz Mountains. As shown in Figure 2-1, most precipitation occurs between the months of December and March.

Based on the 125 years of recorded rainfall in the County, the average annual rainfall in downtown San Jose is about 13 inches and ranges from a low of 4.8 inches to a high of over 30 inches. Figure 2-2 shows the variability in historical rainfall that has occurred in downtown San Jose. During very wet years like 1983, in which 30.25 inches of rain fell and generated more water supply than could be put to beneficial use, the excess water created flooding throughout the County and was lost to the Bay. But in very dry years such as 1976, when only 5.77 inches of rain fell, the water supply generated was extremely low and did not produce enough water to meet demands.

Figure 2-1
Historical San Jose Rainfall

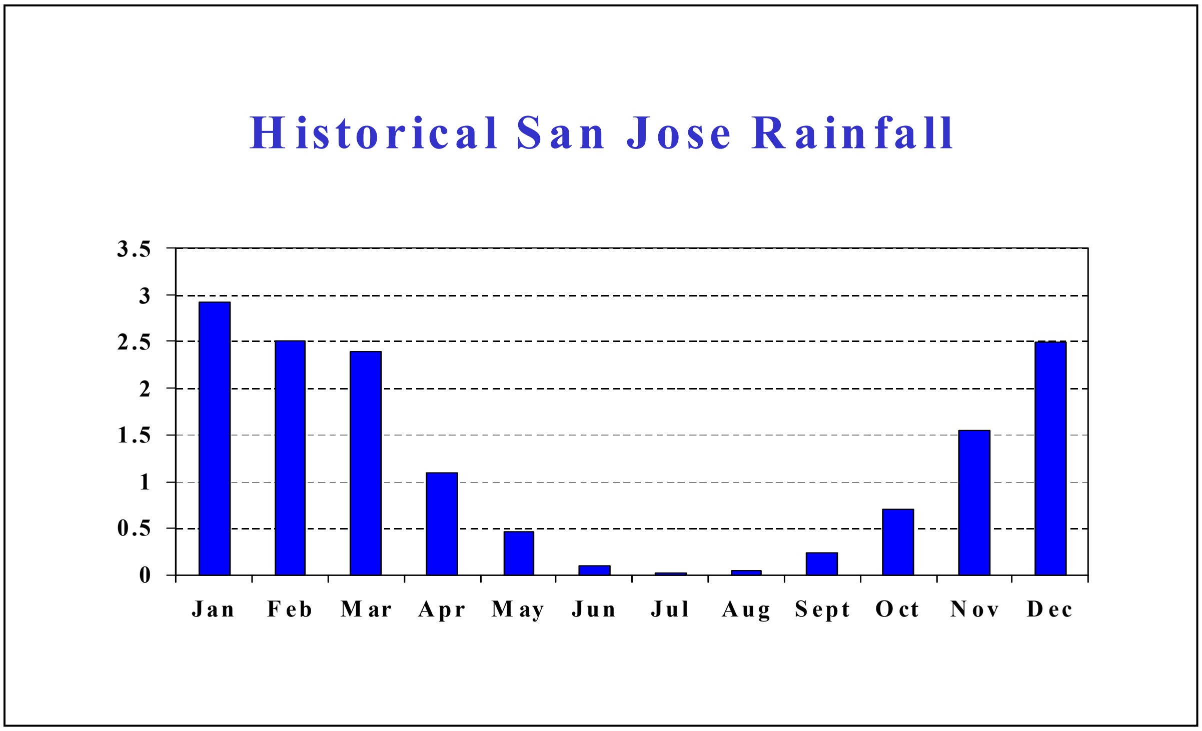
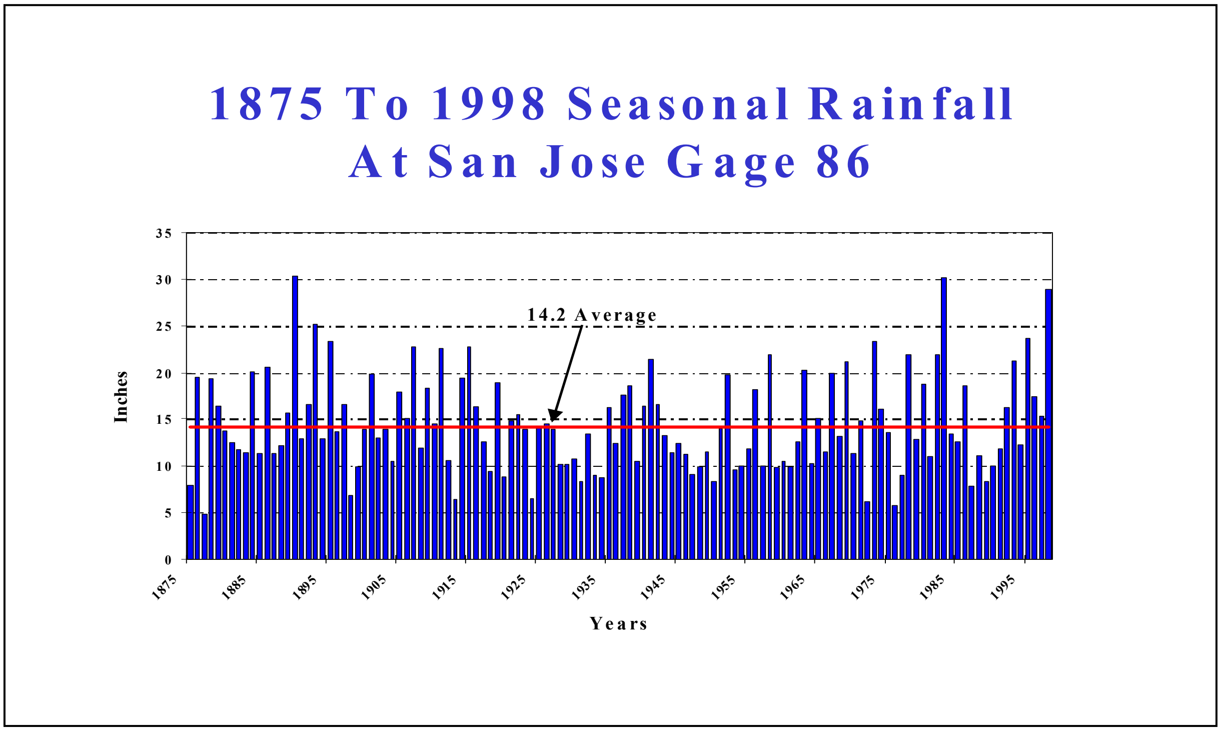


Figure 2-2
Annual Rainfall at San Jose Gage 86



C. Water History of the Valley

Water has played an important part in the development of the Santa Clara Valley since the arrival of the Spaniards in 1776. Unlike the Indians before them, the Spaniards relied on irrigation for farming. They did not tap the groundwater basin, but used surface water to irrigate their crops.

The United States conquered the territory in 1846. Increased population and the need for more food crops lead to the use of the groundwater basin. The first well was drilled in the early 1850s in San Jose. By the mid-1800s the valley's economy shifted from cattle-raising and wheat-growing to the much more water-intensive fruit and nut orchards and vineyards. Wells tapped into the underground water table at an ever-increasing rate and farmers began to see a drop in water levels. By 1919, land surface subsidence of 0.4 ft at San Jose had occurred.

By the late 1920s, several temporary seasonal dams were constructed along Guadalupe Creek to increase the percolation of surface waters into the groundwater basin. Groundwater levels continued to decline. By 1932, the subsidence since 1912 ranged from 0.35 feet in Palo Alto to 3.66 feet in San Jose.

D. District Formation and History

The District traces its origins to the Santa Clara Valley Water Conservation District (SCVWCD), which formed in 1929 to develop a reliable water supply and to build reservoirs to store water and recharge the underground aquifer. Today's organization was built by consolidating and annexing other water districts within the original SCVWCD. In 1974, the word "Conservation" was dropped from the agency name, creating the District as it exists today.

By 1935, the District had completed the construction of Almaden, Calero, Guadalupe, Stevens Creek, and Vasona dams to impound winter waters for recharge into its percolation facilities during the summer. Later dams completed include Coyote in 1936, Anderson in 1950, and Lexington in 1952. The Gavilan Water District in the South County built Chesbro Dam in 1955 and Uvas Dam in 1957.

As the valley's population and economy grew, so did the need for more water. In 1950, most all of the valley's water requirements were met by groundwater, and the level in the Santa Clara Valley Subbasin reached an all-time low.

The 1950s were a period of rapid growth for the County, with the population doubling between 1950 and 1960. To supply this growth, groundwater pumping continued to increase and groundwater levels continued to decline. In 1952, the first imported water had been delivered to the County: Hetch-Hetchy water, wholesaled by the San Francisco Water Department directly to several North County cities. By the early 1960s it was evident that the combination of Hetch-Hetchy imports and local water supplies could not meet the water demands of the growing County.

In 1965, the District began receiving deliveries of water imported from the California

Department of Water Resources' State Water Project (SWP) through the South Bay Aqueduct (SBA). The District also began building water treatment plants to treat a portion of the imported water and reduce the need for groundwater pumping. In 1967, the District started delivering treated water to the residents in the northern part of the County from the Rinconada Water Treatment Plant (WTP) in Los Gatos. With the addition of the SWP imported source and the Rinconada WTP to treat it, groundwater levels recovered and the rate of subsidence significantly slowed.

The 1960s and 1970s were decades of rapid growth for Santa Clara County's population and employment, including the semiconductor and computer manufacturing industries. To meet the continuing need for water, Penitencia WTP began operations in 1974. By the mid-1980s, groundwater pumping accounted for just half of the total water use in the County. The rate of subsidence was reduced to about 0.01 feet per year, compared to 1 foot per year in 1961.

To further increase the reliability of the County's water supply, the District contracted with the United States Bureau of Reclamation for the delivery of additional imported water from the CVP through the San Felipe Project. The first delivery of CVP water took place in 1987, but it was not until 1989 that the Santa Teresa WTP began operations, giving the District the ability to fully utilize this additional source of imported water.

E. The District Today

A seven-member Board of Directors governs the District. Five directors are elected from Santa Clara County supervisorial districts; two are appointed by County supervisors. The Board sets policy and provides direction to District management and staff.

The mission of the District is a healthy, safe, and enhanced quality of living in Santa Clara County through the comprehensive management of water resources in a practical, cost-effective, and environmentally sensitive manner. Accordingly, the District's Board has adopted the following "Ends Policies," which are directions to the CEO/GM as to intended results, organizational products, impacts, benefits, outcomes, recipients, and their relative worth (what good for which recipients at what costs):

1. There is a healthy and safe environment for residents and visitors.
    - 1.1 There is a reliable supply of healthy, clean drinking water.
        - 1.1.1. The water supply meets or exceeds all applicable water quality regulatory standards in a cost-effective manner.
        - 1.1.2. The water supply is reliable to meet current demands.
        - 1.1.3. The water supply is reliable to meet future demands as identified in the District's IWRP process.
        - 1.1.4. There are a variety of water supply sources.
        - 1.1.5. The groundwater basins are aggressively protected from contamination and the threat of contamination.
        - 1.1.6. Water recycling is expanded consistent with the IWRP within Santa Clara County.

1.1.6.1 By the year 2010, water recycling accounts for 5 percent of total water supply in Santa Clara County.
1.1.6.2 By the year 2020, water recycling accounts for 10 percent of total water supply in Santa Clara County.
1.2. There is reduced potential for flood damages.
1.2.1. The cost of reducing the potential for flood damages is balanced with benefits (including possible environmental restoration and enhancement).
1.2.2. There is a balance between the contributions of watersheds and streams in providing for public health and safety and in providing protection of natural resource benefits.
1.2.2.1. Homes, schools, businesses, and transportation networks are protected from flooding and erosion.
1.1.2.2. There is clean, safe water in our creeks and bays.
1.2.2.3. Groundwater supplies are sustained.
2. There is an enhanced quality of life in Santa Clara County.
2.1. Watersheds, streams, and the natural resources therein are protected and when appropriate enhanced or restored.
2.1.1. Healthy creek and bay ecosystems are protected, enhanced, or restored as determined appropriate by the Board.
2.1.1.1. Mitigation for the adverse impacts of District activities are identified.
2.1.1.2. Opportunities to enhance or restore natural resource benefits of streams and watersheds are identified.
2.1.1.3. Mitigation, enhancements, or restorations are implemented when determined appropriate by the Board.
2.2. There are additional open spaces, trails, and parks along creeks and in the watersheds when reasonable and appropriate.

Water management and planning programs and projects that support these policies are summarized in Appendix B.

Chapter 3
The Water Supply System

This chapter describes the District's water supply, treatment, and distribution facilities, including local reservoirs, the groundwater basin, imported supply facilities, raw water conveyance facilities, and the water treatment and distribution system. The District's role as a water wholesaler is also presented, and the County's water retail agencies and their current water demands are identified.

A. System Overview

The District supplies water to local water retail agencies, which in turn provide it to their customers in Santa Clara County. In order to maintain maximum efficiency and flexibility, the water supply comes from a variety of sources. Nearly half is from local groundwater aquifers, and more than half is imported from the Sierra Nevada through pumping stations in the Sacramento-San Joaquin River Delta. Both groundwater and imported water are sold to retailers. The District also manages the groundwater basin to the benefit of agricultural users and other independent groundwater pumpers.

The District's water distribution system is schematically represented in Figure 3-1, and the facilities to store, treat and distribute water are shown in map format in Figure 3-2.

Figure 3-1
Santa Clara County Water Supply and Use Schematic

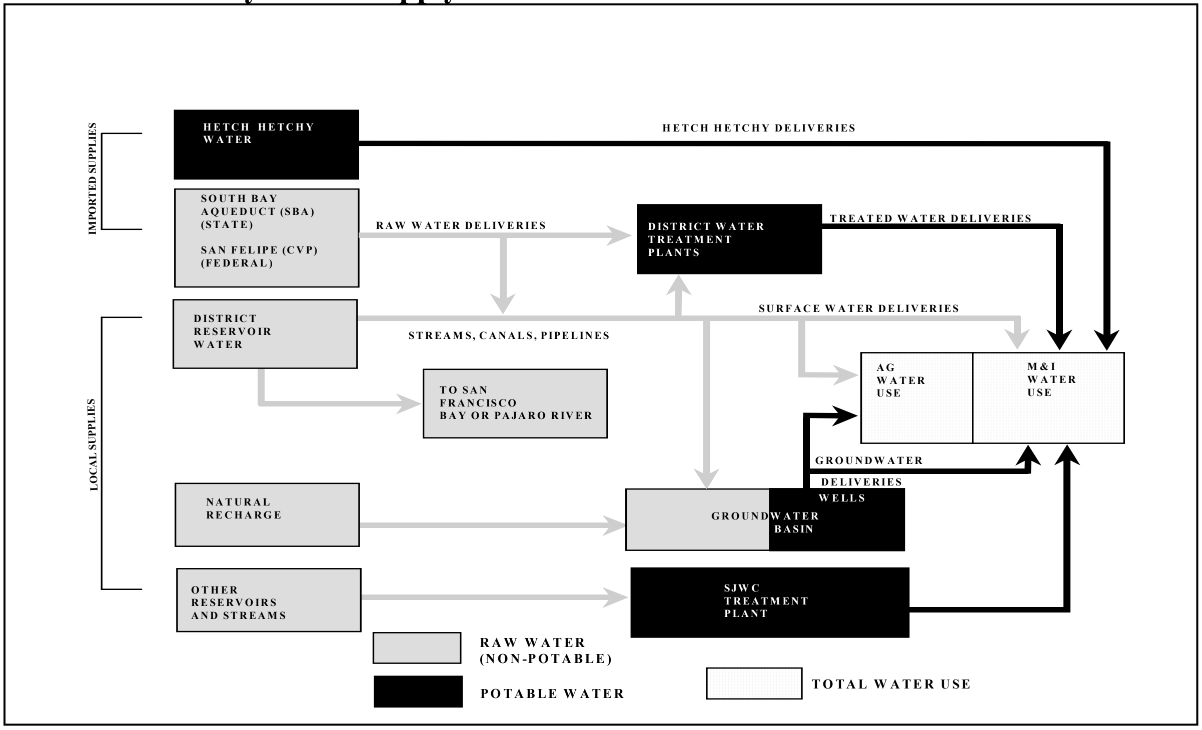
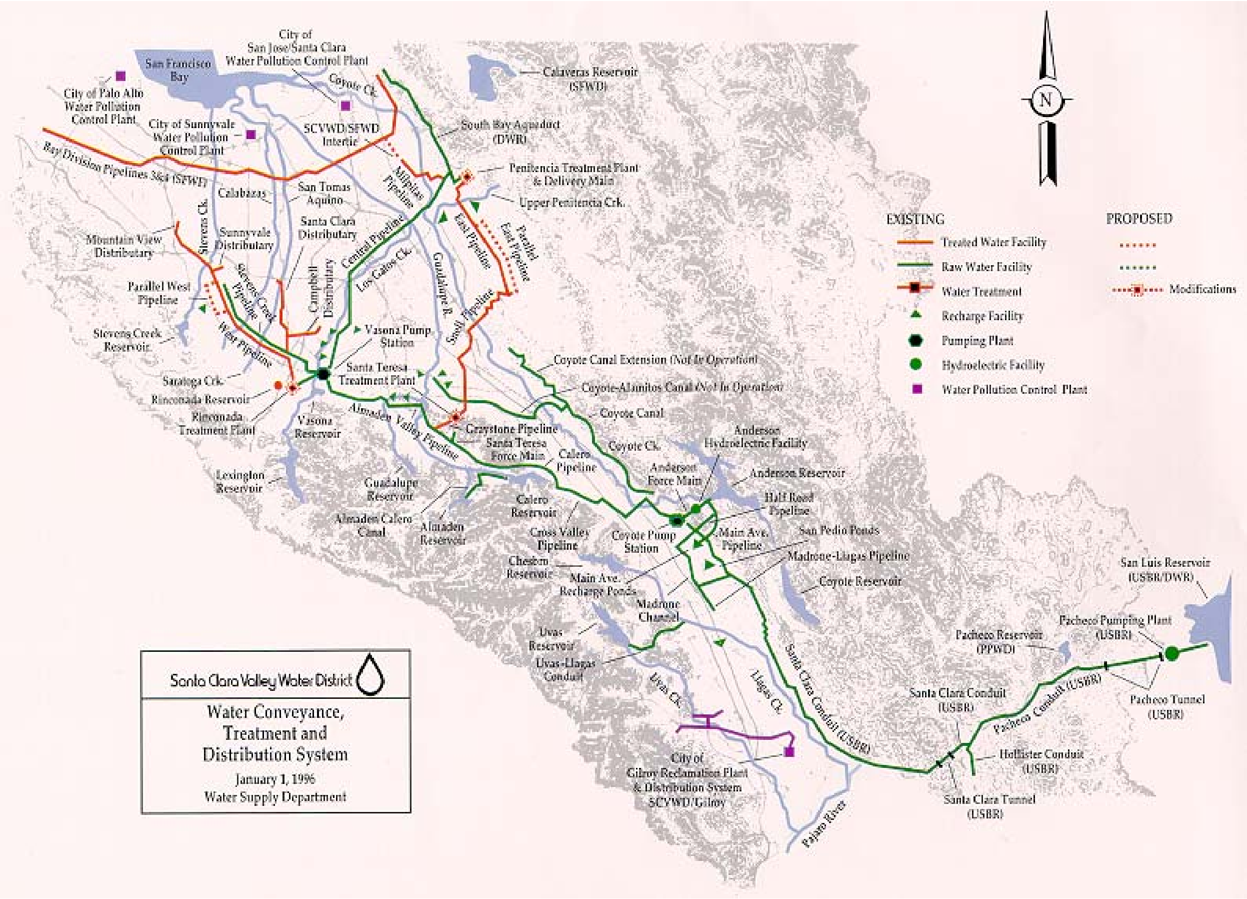


Figure 3-2
District Water Supply Facilities Map



B. Local Reservoirs

Local runoff is captured in local reservoirs for recharge into the groundwater basin or treatment at one of the District's WTPs. The total storage capacity of these reservoirs is 170,000 af. Figure 3-3 lists their significant features.

Figure 3-3
District Reservoirs, Significant Features

Reservoir	Capacity (af)	Year Completed	Surface Area (acres)	Dam Height (feet)
Almaden	1,780	1935	59	105
Anderson	89,073	1950	1,244	240
Calero	10,050	1935	347	98
Chesbro	8,952	1955	265	95
Coyote	22,925	1936	638	120
Guadalupe	3,723	1935	79	129
Lexington	19,834	1952	404	195
Stevens Creek	3,465	1935	92	120
Uvas	9,935	1957	286	118
Vasona	400	1935	58	30

C. Groundwater Basin

The groundwater system in the County performs multiple functions: treatment, transmission, and storage. Water enters the groundwater subbasins through recharge areas generally located at or near the subbasins' perimeter, and is transmitted into the deeper confined aquifer of the central part of the valley. In the process, the water is filtered and becomes suitable for drinking. Eventually the groundwater reaches pumping zones, where it is extracted for municipal, industrial, and agricultural uses. The groundwater basin has vast storage capacity, enabling supplies to be carried over from wet years to dry years.

The Santa Clara Valley Groundwater Basin provides about half of the County's water supply for potable use, through pumping by retail water agencies or individual well owners. The basin is divided into three interconnected subbasins: the Santa Clara Valley Subbasin in North County and the Coyote and Llagas Subbasins in South County.

The Santa Clara Valley Subbasin extends from Coyote Narrows at Metcalf Road to the County's northern boundary. It is bounded on the west by the Santa Cruz mountains and on the east by the

Diablo Range; these two ranges converge at the Coyote Narrows to form the southern limit of the subbasin. The subbasin is 22 miles long and 15 miles wide, with a surface area of 225 square miles. A confined zone within the northern areas of the subbasin is overlaid with a thick clay layer. The southern area is the unconfined zone, or forebay, where the clay layer does not extend. District staff estimates the operational storage capacity of the subbasin to be 350,000 af. (This estimate was recently increased from 250,000 based on a 1999 analysis of the groundwater basin.)

The Llagas Subbasin extends from Cochran Road, near Morgan Hill, south to the County's southern boundary. It is connected to the Bolsa Subbasin of the Hollister Basin and bounded to the south by the Pajaro River (the Santa Clara-San Benito County line). The Llagas Subbasin is approximately 15 miles long, 3 miles wide along its northern boundary, and 6 miles wide along the Pajaro River. The subbasin surface area is approximately 74 square miles. A thick clay layer which extends north from the Pajaro River divides this subbasin into confined and forebay zones. District staff has estimated the operational storage capacity of this subbasin at 150,000 af.

The Coyote Subbasin extends from Metcalf Road south to Cochran Road, and drains into both the Llagas and the Santa Clara Valley Subbasins. This subbasin is approximately 7 miles long and 2 miles wide and has a surface area of approximately 15 square miles. The entire subbasin is unconfined and has no thick clay layers. District staff assumes no year-to-year operational storage volume for this subbasin.

D. Imported Supply Facilities

Imported water comes to the County from the Sierra Nevada mountains via the Sacramento/San Joaquin Delta. This water is delivered by the SWP and the CVP. Imported water is conveyed to Santa Clara County through 3 main pipelines: the South Bay Aqueduct, which carries water from the SWP, and the Santa Clara Conduit and Pacheco Conduit, which bring water from the CVP. The San Francisco Water Department conveys Hetch-Hetchy water into the County through its own facilities.

E. Recharge Facilities

The District operates and maintains 18 major recharge ponds, with a combined surface area of more than 320 acres, and over 30 local creeks. Runoff is captured in the District's reservoirs and released into both instream and offstream recharge ponds for percolation into the groundwater basin. In addition, imported water is delivered by the raw water conveyance system to streams and ponds for groundwater recharge. The annual average recharge of these systems is 157,200 af.

F. Raw Water Conveyance System

The District operates several local pipelines to transport imported raw water and locally conserved water to various locations for treatment and distribution or for groundwater recharge. This conveyance system consists of the Central Pipeline, the Rinconada Force Main, the

Almaden Valley Pipeline, the Calero Pipeline, and the Cross Valley Pipeline. Another facility, the Stevens Creek Pipeline, taps off the Rinconada Force Main and conveys raw water to recharge facilities on the County's west side.

The District owns and operates the Vasona Pumping Plant, with a total capacity of 1,200 horsepower. The District also operates two pumping plants on the San Felipe Project: the Pacheco Pumping Plant and the Coyote Pumping Plant, with a combined horsepower of 36,000.

G. Water Treatment and Distribution Facilities

The Rinconada WTP was constructed in 1967 at a cost of $9 million and can sustain a maximum flow rate of 75 mgd. Of the 75 mgd capacity, 3 mgd are for internal use (backwash water, chemical feed water, etc.) and 72 mgd are available for wholesale to water retailers. Upgrades are under way to increase production at Rinconada to 100 mgd.

The Penitencia WTP was constructed in 1974 at a cost of $5 million and can sustain a maximum flow rate of 42 mgd. Of its capacity, 2 mgd are for internal use and 40 mgd are available for wholesale to water retailers.

The Santa Teresa WTP was constructed in 1989 at a cost of $50 million and can sustain a maximum flow rate of 100 mgd.

Treated water pipelines that distribute water from the treatment plants to the water retailers include the West Pipeline, the Campbell Distributary, the Santa Clara Distributary, the Mountain View Distributary, and the Sunnyvale Distributary from Rinconada WTP; the Snell Pipeline and Graystone Pipeline from Santa Teresa WTP; and the East Pipeline and Milpitas Pipeline from Penitencia WTP.

H. The District's Retailers

The District sells wholesale treated water and groundwater to major public and private water retailers that serve Santa Clara County. The District also provides water directly to the agricultural community and others who have private wells.

In 1999, the water use of the retailers was 313,000 af, as shown in Figure 3-4. Retailers' water use represents the major M&I deliveries of the County. This figure does not include individual well pumping or agricultural users, which in 1999 adds an additional 59,000 af to the water demand.

Figure 3-4
1999 Water Use by Major Retailer
(af)

Major Retailer	Water Use
California Water Co.	14,243
City of Cupertino	3,341
Great Oaks Water Co.	12,694
City of Milpitas	12,525
City of Mountain View	13,980
City of Palo Alto	14,600
Purissima Hills County Water District	2,230
City of San Jose	18,906
San Jose Water Company	152,084
City of Santa Clara	29,010
City of Sunnyvale	25,300
City of Gilroy	7,309
City of Morgan Hill	6,942
Total	**313,164**

Chapter 4
Water Use

This chapter describes the demographics and economy of the County, and the projected water demand to the year 2020. It includes a description of the District's demand planning range and the methods behind these projections. Past and current water use are identified, including an estimate of water use by different customer segments.

A. Demographics and Economy of Santa Clara County

Santa Clara County is home to a very dynamic economy and 1.7 million people. Urbanization has replaced the orchards of North County over the past several decades, while agriculture remains an important part of the South County area.

The County's economy is a key element in the Northern California Bay Area, providing approximately 30 percent of all the jobs in the region. Nicknamed "Silicon Valley," with about one of every five of the County's jobs in high technology, the area continues to attract fast growth industries.

Growth in the County is expected to continue, although at slower rates than in the past. The estimated total population in 2000 was 1,737,000. The Association of Bay Area Governments (ABAG) projects that this will rise to 1,930,700 by the year 2020, compared to 1,497,577 in 1990**,** a 29 percent increase.

The recession of the early 1990s hit Santa Clara County hard. Between July 1990 and August 1993, the County lost about 54,000 jobs. By 1994, the number of jobs began to grow again, eventually exceeding the previous peak. ABAG projects that the number of jobs in 2020 will reach 1,230,760 compared to 852,080 jobs in 1990, a 44 percent increase.

According to ABAG, the long-term trend for the County's economy is expected to be less volatile than in recent years. The network computing industry is expected to become more stable as it grows, and will help diversify the high technology sectors. Strong growth is expected in both the manufacturing and service sectors.

Although the County is adding new households, from 520,180 in 1990 to a projected 651,040 by 2020**,** a 25 percent increase, the rate of household growth will be outpaced by population growth and especially by job growth. The persons per unit is expected to continue to be higher than the historical average, and an increasing number of those employed here will not be residents of the County. This job/housing imbalance is expected to keep housing costs in the area among the highest in the nation.

The demographic data for Santa Clara County from ABAG Projections 98 is summarized in Figure 4-1. Figure 4-2 shows the historic County population based on United States Census data and the projected population from ABAG.

The District's water demand projections are based on ABAG Projections 98 demographic projections, with some modifications based on city planning department reviews. For example, ABAG projects the total number of households. For water demand projections, it is important to further refine this total by residential subsector (single-family residential versus multifamily residential). A preliminary estimate of this breakdown was made based on 1990 census data, and the projections by subsector were reviewed by city planning departments. The City of San Jose is adding significant numbers of new residential units. However, the percentage of new units that are in multifamily developments is greater than in San Jose historically, so the projected breakdown by subsector was modified based on City of San Jose planning department comments. The City of San Jose also recently revised its plan for the Coyote Valley area, changes not reflected in the ABAG projections. Projections for Coyote Valley were also modified to reflect City of San Jose staff review.

Lastly, the projected households and jobs found in regions of the County not served by water retailers in the County or the District are subtracted from the ABAG projections for Santa Clara County to better reflect demand for District and retailer water supplies. The difference is small, reflecting areas within the hills outside the groundwater basin and retailer service.

Figures 4-3 through 4-5 show the projected number of households and jobs used in the demand projections.

Figure 4-1
Santa Clara County Demographics from ABAG Projections 98

	1990	1995	2000	2005	2010	2015	2020
Jobs	852,080	827,350	1,013,360	1,077,440	1,141,380	1,185,220	1,230,760
Population	1,497,577	1,599,100	1,739,800	1,809,500	1,864,300	1,901,100	1,930,700
Persons Per Household	2.81	2.90	3.01	2.99	2.95	2.93	2.91
Households	520,180	538,900	565,730	592,690	619,430	636,430	651,040
Employed Residents	812,345	809,300	897,100	952,200	988,900	1,027,600	1,059,200
Mean Household Income	$70,262	$73,800	$83,300	$88,700	$94,400	$100,000	$106,800

Figure 4-2
Santa Clara County Population

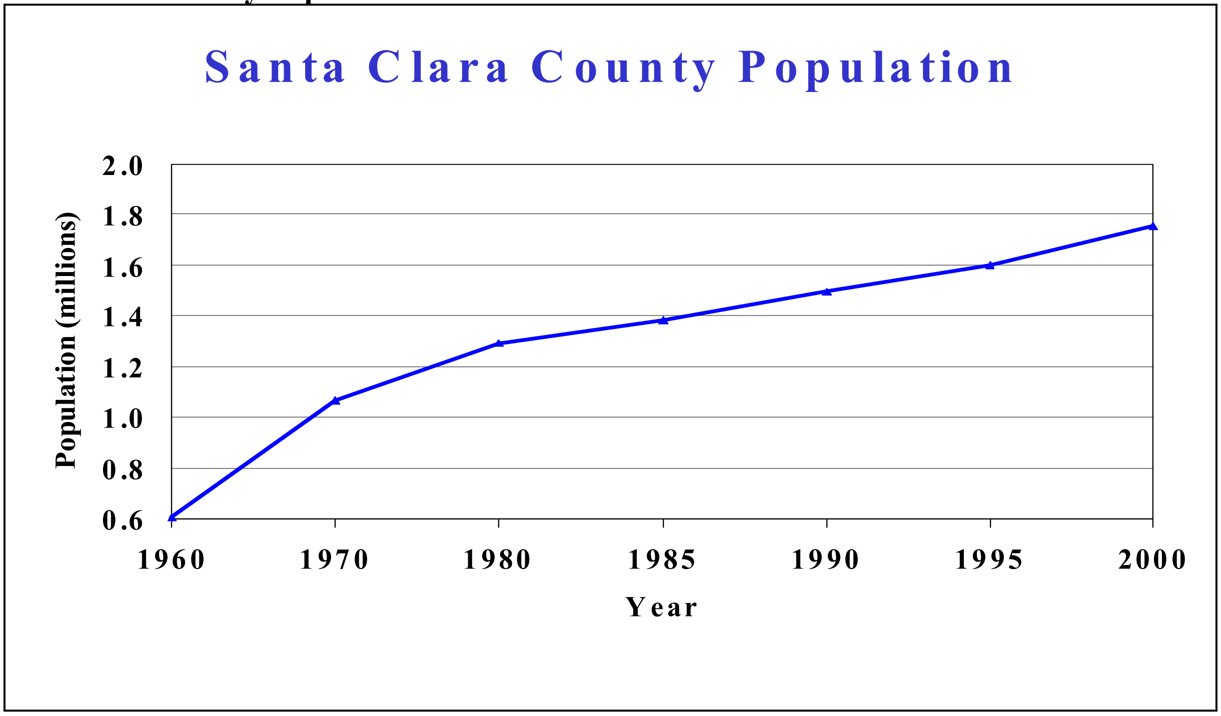


Figure 4-3
Projected Households

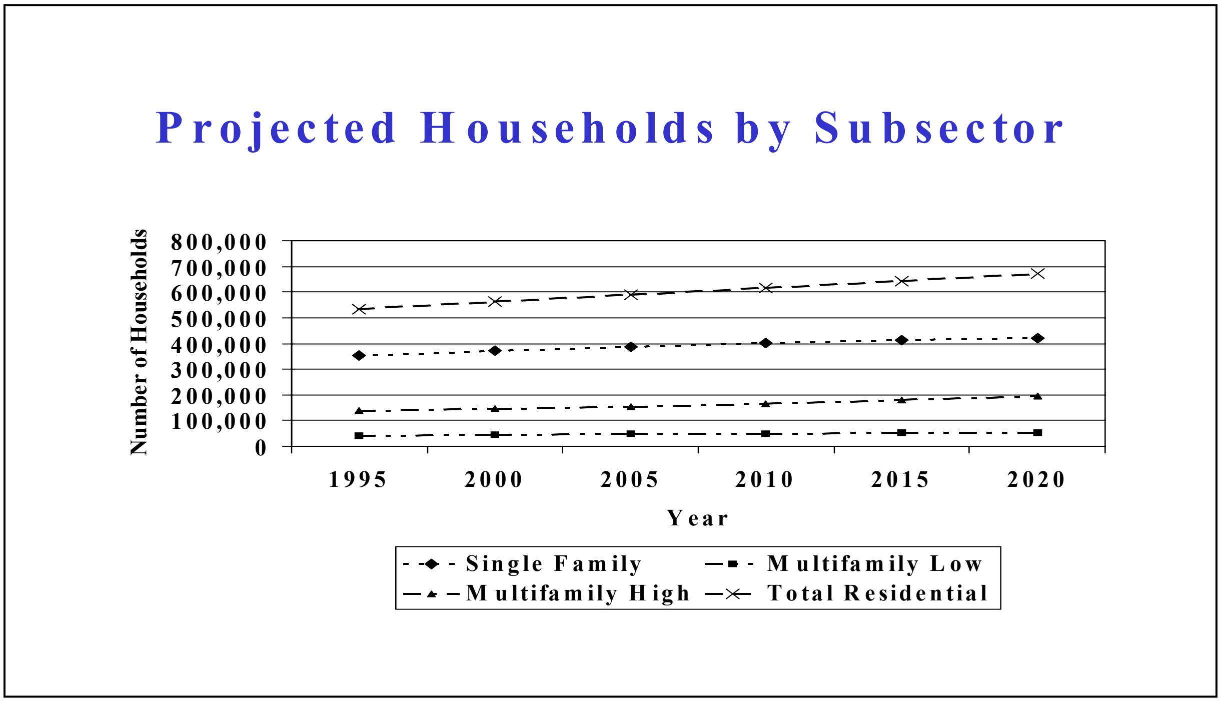


Figure 4-4
Projected Jobs

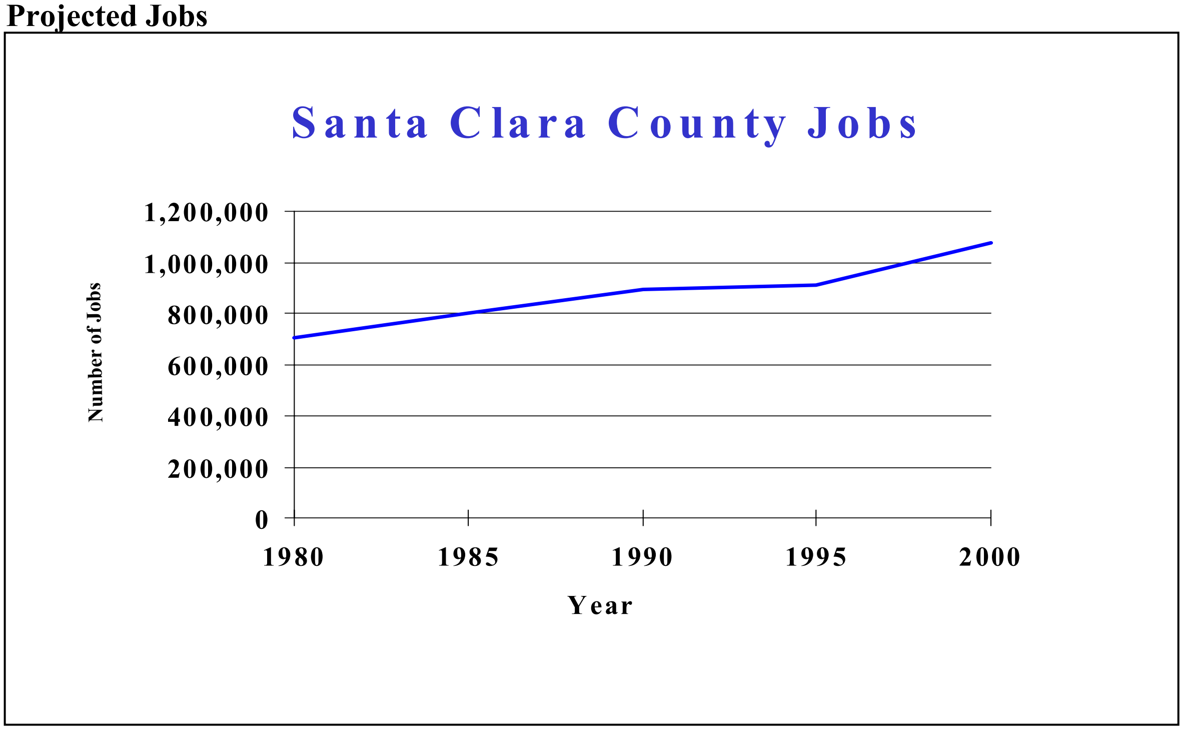
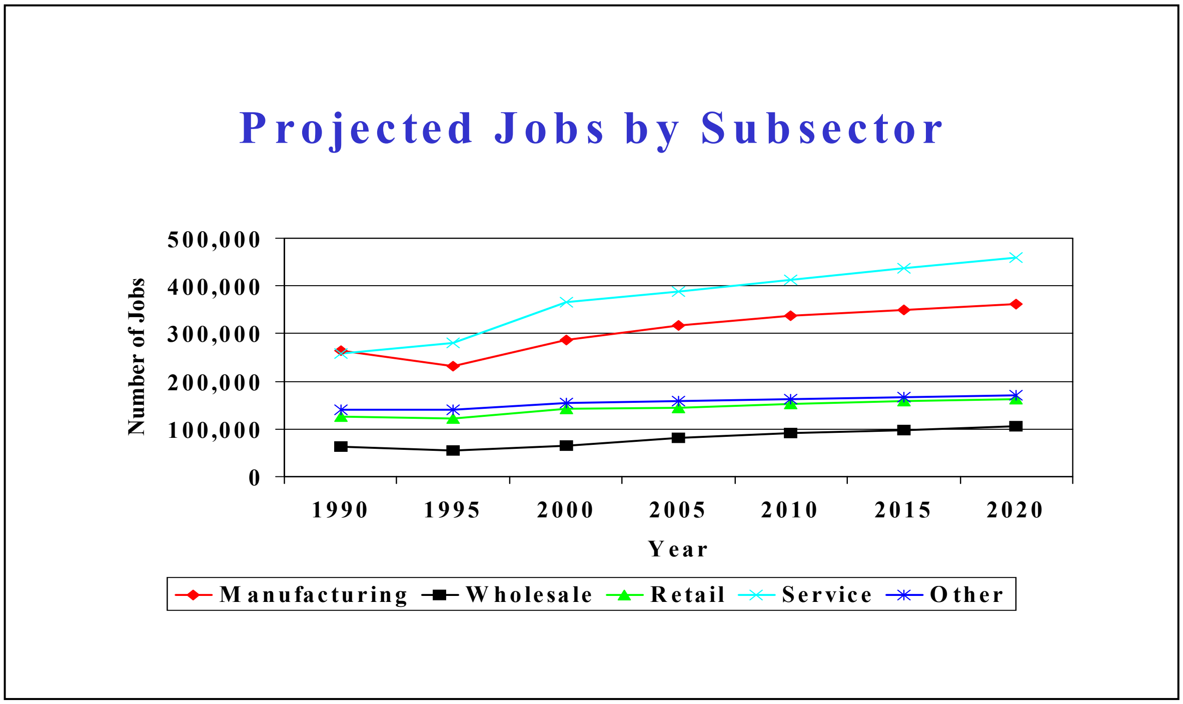


Figure 4-5
Projected Jobs by Subsector

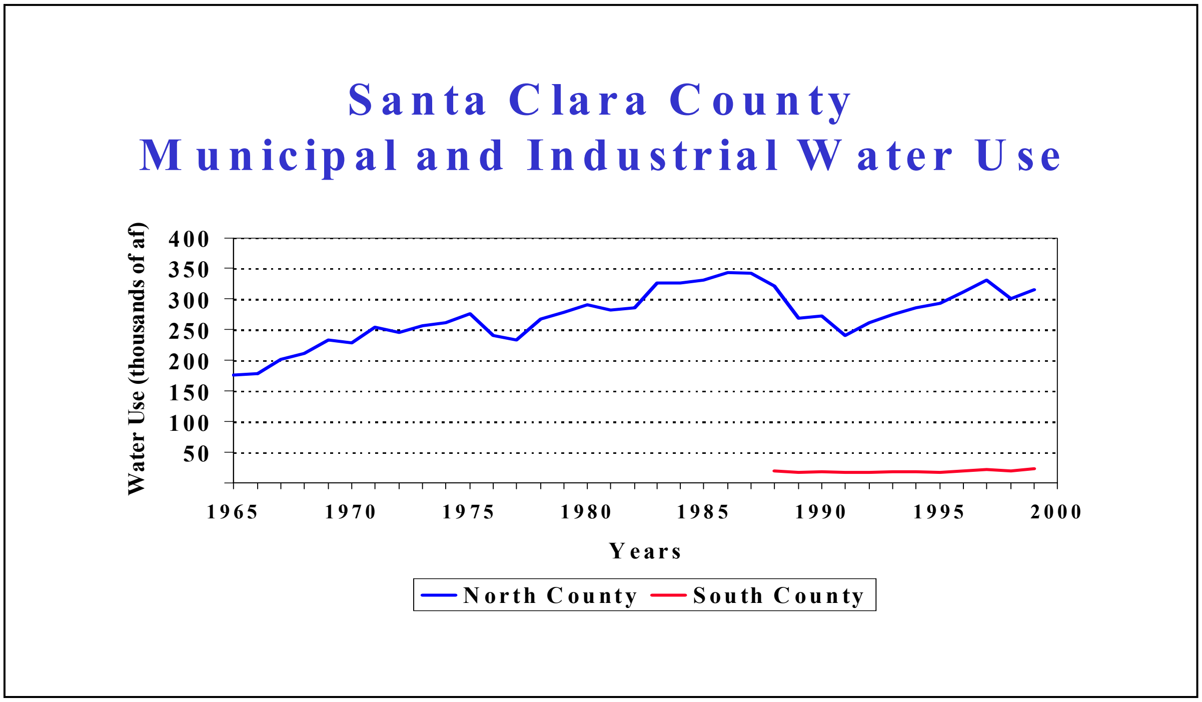


B. Historical Water Use

Santa Clara County ranks fourth in the state in terms of population and jobs. Municipal and industrial (M & I) water use, which includes residential, commercial, industrial, and institutional water use, has grown as a result of urbanization. Conversely, agricultural water use has declined as irrigated agricultural land has been converted to other uses. Environmental demands, such as water required to meet downstream fishery needs, have been minimal in the past but may become more significant in the future.

The District has been recording water use in North County since 1964, but its records for South County water usage are relatively short, beginning in July 1987. For the North County, water use has varied from a low of about 175,000 af in 1965 to a high of about 349,000 af in 1987. In 1999, North County water use was 318,000 af, of which less than 2,000 af was agricultural use. South County total water for the past decade has ranged from about 42,000 af in the drought year 1989 to 56,000 af in 1997. In 1999, the South County water use was 54,000 af, of which 24,000 af was M&I water use. Figure 4-6 shows the M&I water use for both areas of the County**.**

Figure 4-6
Santa Clara County Municipal and Industrial Water Use



The most dramatic variations in Figure 4-6 are the drops in use during the droughts of 1976-1977 and 1987-1992. Due to supply limitations, either voluntary or mandatory use reduction measures were enacted in these years. After a drought ends, as people replace lost landscape and return to previous water use habits, water demands may return to previous levels. The years after the 1977 drought show this effect. The rebound from the most recent drought is more complicated. First, given its multi-year duration, there is some indication that some of the water use changes made during the drought have led to permanent water savings. Second, the drought coincided with an economic recession in the region. As industries cut back on production due to the recession, their water use decreased as well. To some degree the timing of the water demand rebound from this most recent drought is tied to the economic recovery of the County.

C. Conservation Savings Projections

Understanding the impact of water conservation savings on water demand projections is important for two reasons:

- Because the calibrated water use model reflects programs in place during the calibration year, the effects of the current conservation program must be considered to ensure that the savings are not counted twice in the demand projection.

- Future savings from current and anticipated conservation programs must be accounted for in the demand range.

The projected demand range reflects both passive and active conservation. Active water conservation is defined as reduced demands that are directly attributable to District programs. Passive water conservation is defined as reduced demands that are attributable to water-efficiency standards and ordinances. These demand reductions would occur regardless of District's programs. Although the District is not responsible for passive conservation, it is important to estimate and account for such water savings to ensure that projected water demand does not overestimate the water need that will occur in the future. Legislative changes that limit the sales of new toilets and showerheads to water-conserving models are examples of passive conservation reflected in the demand forecast.

Figure 4-7 shows the demand reductions resulting from both active and passive conservation. Using 1992 (the first year of the District's conservation program) as a baseline, year 2020 water demand in Santa Clara County is estimated to be approximately 67,000 to 72,000 af/year less than it would have been in the absence of water conservation activity. Changing the baseline year to 1997 (consistent with that used in the demand projection) reduces the range to approximately 53,000 to 58,000 af/year. Active savings account for 41 percent to 46 percent of the total projected demand reduction. Figure 4-8 summarizes the annual savings by water use sector. The District's conservation program and savings estimates are described further in Chapter 11.

Figure 4-7
Demand Management Projections Summary

Demand Component/ Conservation Program	Demand Reduction 1992-2020 (af/year)	Demand Reduction 1998-2020 (af/year)	Percent Attributed to Active Demand Reduction	Percent Attributed to Passive Demand Reduction
Residential Toilets	24,300	17,600	26%	74%
Residential Washers[1]	2,000-7,200	1,900-7,200	4-80%	20-96%
Residential Showers	7,000	4,200	3%	97%
Residential Faucets	4,000	1,600	0%	100%
Residential Leaks	2,300	2,300	100%	0%
Residential Landscape	9,200	8,800	100%	0%
CII[2] (all uses except toilets)	9,800	9,000	100%	0%
CII Toilets	7,400	6,200	9%	91%
Agricultural	1,000	1,000	100%	0%
Total	**67,000-72,000**	**53,000-58,000**	**41-46%**	**54-59%**

[1] The wide range for these figures is due to uncertainty regarding whether an efficiency standard for clothes washers will be adopted by the U.S. Department of Energy. Without a standard, 80 percent of savings will be active; with a standard only 4 percent will be active.
[2] Commercial/Industrial/Institutional

Figure 4-8
Demand Management Projections Summary (Equivalent Format to IWRP)
(af/year)

Sector	Year 2020 Active Savings	Year 2020 Total Savings
Residential Interior	9,000 – 9,600	39,700 – 44,700
Residential Exterior	9,200	9,200
CII Interior	6,700	13,400
CII Exterior	3,700	3,700
Agricultural	1,000	1,000
Total	**29,600 – 30,200**	**67,000 – 72,000**

D. The Demand Range

The use of a demand range (as opposed to a single demand projection line) acknowledges that many of the factors that drive water demand, such as water use patterns and demographic growth, are difficult to predict and not within the District's control. For example, the 1990s saw drought and drought rebound, economic recession and economic boom.

In recognition of the uncertainty in the demographic projections, previous ABAG projections were compared to those used in the water demand projection analysis. Alternate water demand projections were performed using the lower and upper demographic projections made by ABAG in the past.

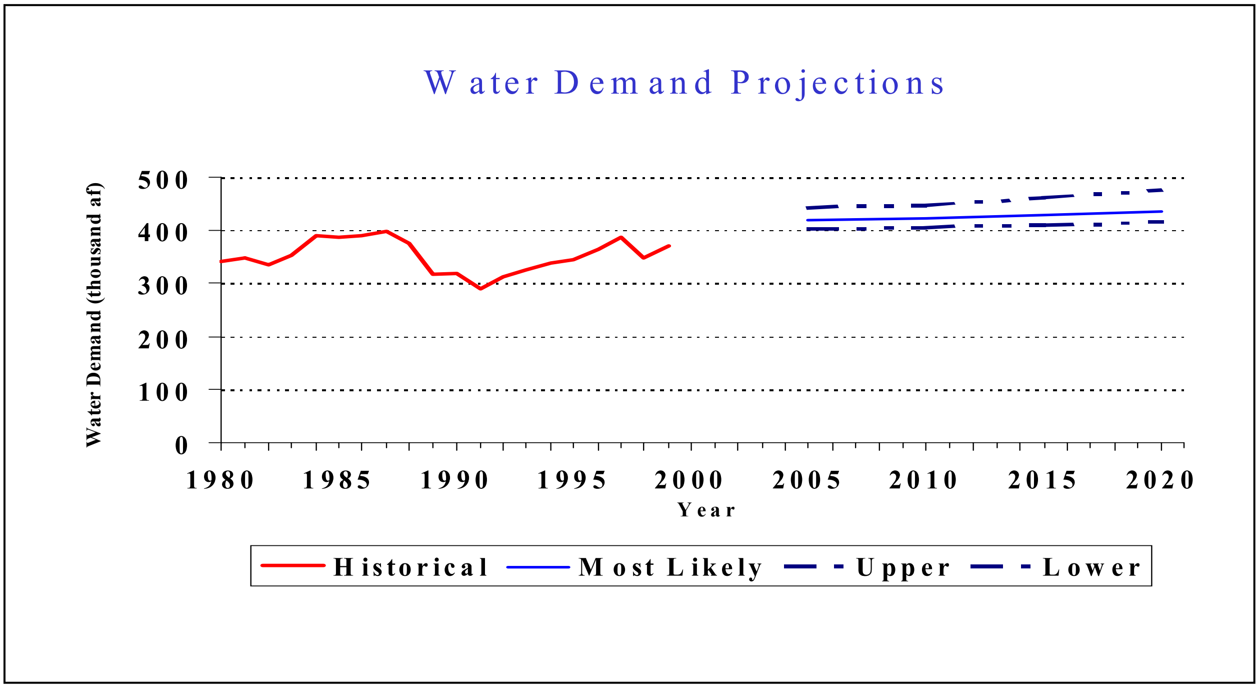
The most likely water demand projection is based on the most current demographic projections available by census tract at the time the analysis was performed (ABAG Projections 98), as described earlier in this chapter. The upper bound water demand projection is based on the demographic projections found in ABAG Projections 85, which were the highest demographic projections for the County made by ABAG. Since these projections were only through year 2005, the household and job data was extrapolated through 2020. The lower bound water demand projection is based on the employment projections found in ABAG Projections 94, the lowest demographic projections for the County made by ABAG. These projections were impacted considerably by the recession in the early 1990s, when job growth was not expected to return to previous levels. The lowest ABAG household projection is found in ABAG Projections 98, so the same residential projection was used for the lower bound and the midline water demand projections.

Figure 4-9 tabulates the M&I and agricultural water demand projections as well as the conservation projections, resulting in the water demand range. Figure 4-10 shows the historical and projected County water demand.

Figure 4-9
Projected Water Demand and Conservation Projections
(af/year)

Year		2000	2005	2010	2015	2020
M&I Demand	Lower	356,466	374,503	392,616	408,137	423,836
	Most likely	371,153	390,205	409,348	426,221	443,205
	Upper	394,021	413,213	433,736	459,331	486,178
Agricultural Demand		60,169	56,309	52,462	48,624	44,799
Conservation Savings		-10,345	-26,560	-38,478	-45,819	-52,715
Total Demand	**Lower**	**406,290**	**404,252**	**406,600**	**410,942**	**415,920**
	Most likely	**420,977**	**419,954**	**423,332**	**429,026**	**435,289**
	Upper	**443,845**	**442,962**	**447,720**	**462,136**	**478,262**

Figure 4-10
Historical and Projected Water Demand

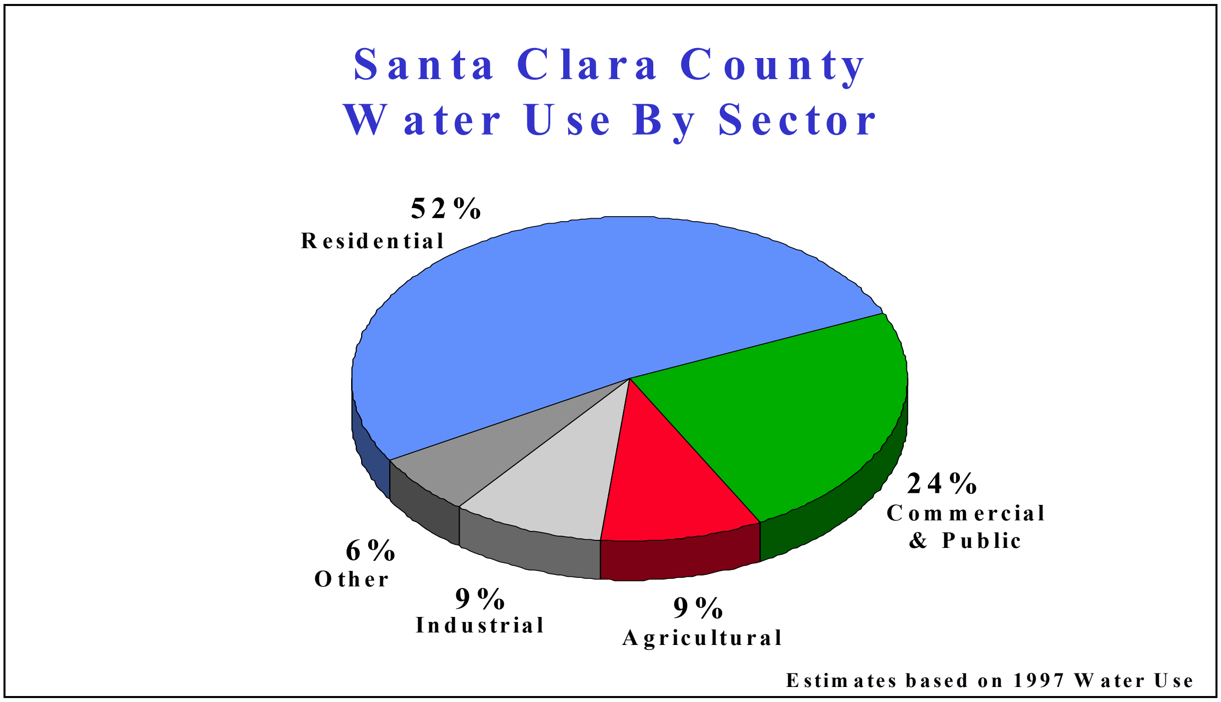


E. Use by Sector

Currently, District records show that the water use in the County is about 91 percent municipal and industrial and about 9 percent agricultural. As a wholesaler, the District does not have water use data segregated by class. However, the estimated breakdown by sector, based on demographic data**,** appears in Figure 4-11.

Although the District collects and analyzes water use patterns based on retailer use-by-class data, each of the retailers in the County uses a different classification breakdown, making compilation or analysis of the information difficult. The District hopes to work with its water retailers to develop consistent reporting methods that facilitate the transfer and use of retailers' data.

Figure 4-11
County Water Use by Sector



Chapter 5

Water Supply Outlook

This chapter examines the water supply outlook in the County under different hydrologic conditions. It presents the amount of water available from existing local and imported supplies, including improvements to supply and supply reliability enhancements.

A. Characterizing Hydrologic Supplies

Since water supplies available to the County are obtained from both local and imported sources, the District's water supply is a function of the amount of precipitation that falls both locally and in the watersheds of the Sierra Nevada.

One important consideration in water supply planning is the concept of usable supply. For surface water, this means the surface flow that can be diverted to and stored in a reservoir, or diverted and put to use at a WTP or groundwater recharge facility. Groundwater supplies include water recharged to the groundwater basin from direct precipitation, net leakage from pipelines, irrigation return flows, and subsurface inflows from adjacent areas. Thus, the supply available is a function of the facilities in place to develop the supply.

As was shown in Figure 2-2, the water supply that will occur in any one year varies unpredictably. To address these variations, the District uses four different hydrologic scenarios to characterize water supplies: the wet year, the long-term average (LTA), the single dry year, and the critical dry period (CDP).

1. Wet Year Supply

The wet year supply is defined as the maximum operationally usable supply available during the historic record, equivalent to that experienced in 1983. In the case of local supplies, this will be the maximum that can be developed by currently existing facilities. In the case of imported supplies, it will be the maximum entitlement under the contract.

2. Long-Term Average Supply

The LTA supply is defined as the average supply available over the historic hydrologic record, given currently existing facilities. For imported supplies, this is the average supply the District could expect with currently existing facilities and contractual demands over the historical hydrology from 1922 through 1990, with current environmental regulations in place. This is not the same as the average of the District's actual past water deliveries from these sources. What is of interest is what the District would have available if the historical hydrology were to recur, not what the District actually received in the past.

3. Single Dry Year Supply

The single dry year supply is defined as the minimum operationally usable supply available during the historic record, equivalent to what would be experienced if the hydrology of 1977 were repeated with current facilities in place.

4. Critical Dry Period Supply

Evaluating the availability of the County's existing and projected local water supplies requires an understanding of the driest periods that can reasonably be expected to occur. This evaluation approach considers how often drought events have occurred and whether they are frequent enough to warrant designing the utility's system to withstand them; how much existing supply is available during a drought; and what duration of drought is most critical to the utility's system.

Over the more than 120 years of recorded rainfall, seven major drought events have occurred, each lasting from 1 to 10 years. The supply severity of 1-in-100 or greater, often called a 1-percent probability event, has occurred in four of these seven droughts, ranging from 1 to 7 years. The longest and most severe of these for the storage capacity of the District system is the 1927-1934 dry period, which had a supply severity slightly worse than a 1-percent probability event.

The amount of storage capacity in a system affects its ability to cope with a drought event. Droughts of longer duration have greater rainfall averages than shorter droughts of the same severity. Hence, the supply severity of a 1-year drought would be the worst for a system with no storage because it has the lowest rainfall and generates the least amount of water supply. A system with a large storage capacity could store a great amount of carryover storage in comparison to water needs and could go through short-term droughts by borrowing from this storage. The worse drought for this system would be a drought of long-term duration when finally all of the utility's carryover storage had been used.

An analysis of the County's water supply system showed that the District is more vulnerable to droughts of long duration, which exhaust the groundwater basin's operational storage. Since 1-percent probability events have been observed several times in the historic record, this severity was chosen as a reasonable drought design criterion. For these reasons, the District designs its system for a 10-year 1-percent probability drought: the CDP. The CDP is equivalent to the 1987-1992 drought extended to a 10-year duration and 1-percent probability severity event.

B. Local Water Supplies

The County's local water supply comes from rainfall and the ensuing surface water runoff and natural groundwater yield. Identifying historical availability of these resources allows the District to develop forecasts about how much local water yield can be expected under various hydrological conditions. To determine how much surface water has historically been available, the District relies on records of rainfall, surface flow, pumping, and artificial recharge; these, in turn, are used to calculate annual groundwater yield.

The hydrologic data available for the County is limited. While there are over 120 years of continuous rainfall data at one site in San Jose, most of the stream flow and reservoir inflow data dates only as far back as the 1930s or 1940s, and records for some streams and reservoirs begin as late as 1962.

1. Surface Water Yield

The District's local surface water supplies include the stream flows that feed into and out of the District's reservoirs, stream flows that are not captured by reservoirs, and water that flows overland into reservoirs. The average surface flow in the County, based on the hydrologic data for the period 1967 to 1991, is about 193,700 af/year. Over the LTA, less than half of this water supply, or 91,000 af/year, can be captured and used through surface diversions or recharged into the groundwater basin. During a dry period, the surface water flow and the yield are approximately the same; that is, the yield averages only 54,000 and no water is lost to either the San Francisco or Monterey Bays. The maximum flow the District's system can put to beneficial use is about 140,000 af/year.

The shortfall on the LTA yield is due in part to the capacity limits of the District's storage, recharge, and conveyance facilities. Some dams and reservoirs are not large enough to capture all of the reservoir inflows that could be put to beneficial use. If a reservoir spills frequently, much of the flow that could have been developed into yield will instead flow to the Bay. Or, the yield of a stream system might be limited due to the downstream recharge capacity. If stream flows are much higher than the recharge capacity, much of the flow will not be developed into water supply yield. If more recharge capacity could be developed on these streams, then more of the available local streamflow could be recharged into the groundwater basin.

A comparison of the District's local surface water flows and yields is shown in Figure 5-1 by stream type. The first, unregulated streams, do not flow into or out of a reservoir. The next component, regulated streams, include reservoir inflow, which flows from creeks and over land into a reservoir, and downstream accretions, which enter a regulated stream downstream of a dam. Although regulated streams have an average yield of 49 percent, three of these (Stevens, Alamitos, and Uvas Creeks) are well below that and have the potential for greater yield.

Figure 5-1 Historic Surface Water Supply

Facility	Average Surface Flow (af/year)	Average Local Yield (af/year)	Yield as Percent of Surface Flow
UNREGULATED STREAMS			
Regnart Creek	200	100	50%
Calabazas Creek	700	500	71%
Rodeo Creek	30	30	100%
Saratoga Creek	6,100	1,900	31%
Wildcat Creek	1,500	200	13%
San Tomas Creek	1,600	300	19%
Ross Creek	900	700	78%
Penitencia Creek	4,300	900	21%
Thompson Creek	900	400	44%
Silver Creek	1,600	500	31%
SUBTOTAL	**17,800**	**5,500**	**31%**
REGULATED STREAMS			
Stevens Creek Total		3,300	32%
Reservoir Inflow	10,400		
Los Gatos Creek Total		16,600	74%
Reservoir Inflow	21,900		
Downstream Accretions	400		
Guadalupe River Total		5,500	60%
Reservoir Inflow	4,900		
Downstream Accretions	4,200		
Alamitos Creek Total		4,400	38%
Reservoir Inflow	10,900		
Downstream Accretions	800		
Calero Creek Total		4,000	54%
Reservoir Inflow	4,200		
Downstream Accretions	3,200		
Coyote Creek Total		34,700	65%
Reservoir Inflow (Coyote)	31,900		
Reservoir Inflow (Anderson)	21,100		
Llagas Creek Total		9,000	87%
Reservoir Inflow	10,400		
Uvas Creek Total		8,000	16%
Reservoir Inflow	27,100		
Downstream Accretions	24,500		
SUBTOTAL	**175,900**	**85,500**	**49%**
TOTAL	**193,700**	**91,000**	**47%**

2. Natural Groundwater Recharge

Recharge to the groundwater basin consists of both natural groundwater recharge and artificial recharge of local surface water and imported water. Natural groundwater recharge includes recharge from rainfall, net leakage from pipelines, seepage from the surrounding hills, seepage into and out of the groundwater basin, and net irrigation return flows to the basin. Estimates of the natural groundwater recharge for the three subbasins are shown in Figure 5-2. Artificial recharge is not shown, as that water has already been accounted for (as either local surface supply or imported water supply).

Figure 5-2
Natural Groundwater Recharge
(af/year)

	Santa Clara Subbasin	Coyote Subbasin	Llagas Subbasin	Total
Wet Year	126,000	10,000	89,000	225,000
LTA	62,900	4,900	44,300	112,100
Single Dry Year	0	0	0	0
CDP	41,400	3,200	29,100	73,700

3. Non-District Local Supplies

Other agencies also develop water locally. The SJWC and Stanford University both hold surface water rights. Stanford's local water development is small. SJWC, however, has developed an average yield of 9,500 af from a run-of-the-river treatment facility on Saratoga Creek and from Elsman Reservoir in the Los Gatos Creek watershed. These projects are reflected in the local surface water yields listed above.

4. Recycled Water

Recycled, or reclaimed, water is a local water source that is being developed by the County's four water pollution control plants. The District currently subsidizes any recycled water project that offsets the need for District potable supplies at $115 per af of recycled water developed. Since recycled water is developed from wastewater flows, its yield is not dependent on hydrologic conditions. The yields are available in all years, even during the CDP.

In its long-range planning, the District anticipates 20,000 af of non-potable recycled water will be developed by existing or planned projects within the County:

San Jose/Santa Clara	12,000 af
Sunnyvale Phase I	3,000 af
Palo Alto	500 af
Gilroy/Morgan Hill	4,000 af

In addition to these programs, the District continues to investigate the potential for cooperative programs with local wastewater agencies. The preferred strategy, which guides the District's actions in water resources planning, calls for an additional 25,000 af of long-term transfers or water recycling to be developed sometime in the next decade. This strategy was designed to be flexible, so the timing for committing to such additional supplies depends on where future water demands appear to be falling within the demand range, and on the opportunities that arise. Existing and potential recycled water projects are described further in Chapter 8.

C. Imported Water Supplies

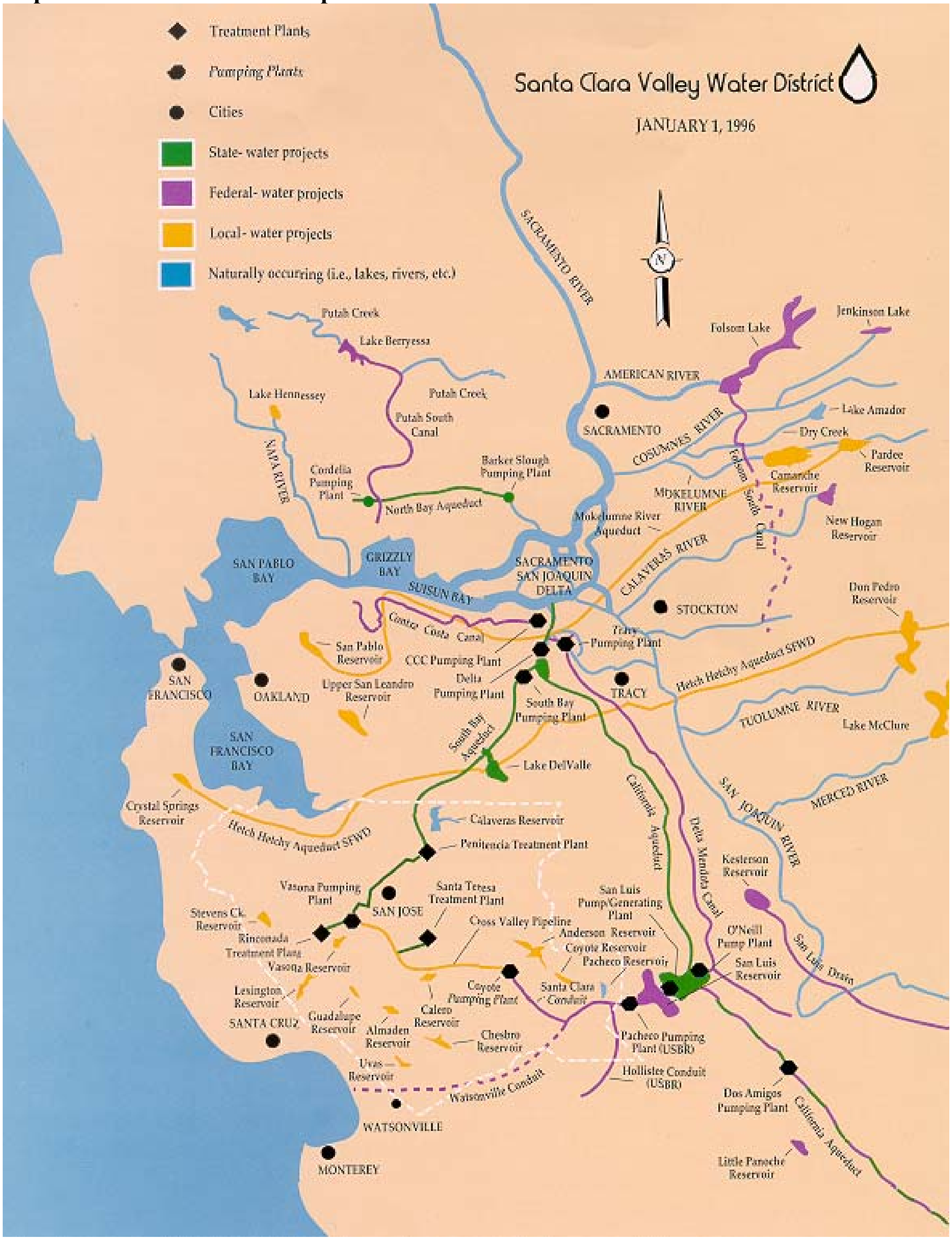
The County receives imported water from San Francisco Water Department's Hetch-Hetchy system, the SWP and the CVP. A map of these projects is shown in Figure 5-3.

1. Hetch-Hetchy

Several of the municipalities in the County have contracts with the City and County of San Francisco for water from the Hetch-Hetchy project. Hetch-Hetchy imported deliveries originate in the Tuolumne River watershed high in the Sierra Nevada mountains and are transported directly by closed conduit to the Bay Area. The District does not control or administer Hetch-Hetchy deliveries to the County; however, this supply reduces the demands on District-supplied water.

The contracts under which the agencies in the County receive water from the Hetch-Hetchy system are defined as either interruptible or non-interruptible. The cities of San Jose and Santa Clara have interruptible contracts; the other agencies all have non-interruptible contracts. During dry periods, deliveries to all contractors can be reduced. The deliveries to Santa Clara and San Jose, however, can be discontinued entirely at the discretion of the San Francisco Water Department.

Figure 5-3
Imported Water Facilities Map



It is difficult to estimate future water reliability from Hetch-Hetchy at this time. During the recent drought of 1986 to 1992, the reservoirs in the San Francisco Public Utilities Commission (SFPUC) system became seriously depleted. With the depletion of water from their reservoirs during this dry period, the SFPUC supply was shown to be less reliable than previously thought. Given regulatory uncertainties and a system that is quite old and in need of repair, a master plan to evaluate the SFPUC's system was undertaken. In 1997, the SFPUC and the Bay Area Water Users Association (BAWUA) entered into a Memorandum of Understanding establishing a cooperative framework for preparing a Water Supply Master Plan. The strategy recommended by the SFPUC/BAWUA Water Supply Master Plan included three major components: demand management, development of additional supplies, and improvements or additions to facilities, at an estimated cost of over $600 million. The next step is the adoption of the Water Supply Master Plan by the SFPUC and BAWUA Board of Directors.

Given the current uncertainty in future Hetch-Hetchy deliveries, the supply projections in this UWMP are based on historical usage and assume that the interruptible contracts will not be discontinued. Given this assumption, the Hetch-Hetchy deliveries to the County under LTA conditions are expected to be approximately 63,800 af/year. As little as 52,900 af/year is assumed available on average in the CDP, compared to the historical low delivery of 36,900 af in a single dry year, 1977. The maximum delivery that is expected during a wet year is 76,000 af/year.

2. The State Water Project

The District has a contract for 100,000 af/year of water from the SWP, delivered via the Banks pumping plant in the southern Delta and the SBA. Currently, the SWP has developed only about half of the firm yield originally planned to meet the current and future quantity of water that the project has contracted to deliver.

In recent years, negotiations among State Water Contractors and DWR resulted in the Monterey Agreement, which restructures operations and finances of the SWP. The Monterey Agreement is aimed at maximizing existing SWP facilities and wet-year water to offset the fact that additional SWP dry-year firm yield may not be developed for many years, if ever. Under the agreement, DWR allows the Kern Groundwater Bank to be developed by Kern County Water Agency, and allows State Water Contractors to store wet-year water outside their service area for future dry-year use. Annual dry-year shortages are shared equally by M&I and agricultural contractors in return for the permanent transfer of 130,000 af of agricultural entitlement to M&I contractors. Under the Monterey Agreement, the District's expected CDP deliveries are 47,000 af/year, and LTA deliveries are 74,000 af/year.

3. The Central Valley Project

The District's imported CVP deliveries come from the Tracy pumping plant located in the Southern Delta, through the Delta Mendota Canal to San Luis Reservoir, and through the San Felipe Project into Santa Clara County. The project is contracted to deliver 152,500 af/year (130,000 af/year for M&I needs and 22,500 af/year for agricultural needs).

The U.S. Bureau of Reclamation has an interim M&I reliability policy which generally provides minimum M&I deliveries in times of shortage equal to 75 percent of historic use. Current operational analyses show that the Bureau of Reclamation may not be able to meet this level of delivery approximately 15 percent of the time due to increased environmental regulations. Also, the District's use of CVP water is affected by many other factors, including water quality and the availability of alternate supplies in normal and wet years. Therefore, the District negotiated a Water Reallocation Agreement in April 1997, which converts the dry year delivery basis from 75 percent of historical use to 75 percent of contract quantity.

The Water Reallocation Agreement involves two other CVP agricultural districts, Westlands Water District and San Luis Water District. Under this agreement, the District can use the Westlands and San Luis allocations to supplement its water supplies in years when CVP entitlements are less than 75 percent. Under the currently proposed reliability policy, in severely dry years, agricultural water users may be cut back to no CVP deliveries while M&I use is limited to "health and safety" levels, a term not currently defined. This policy is still being negotiated with the USBR. Due to uncertainty in its interpretation, the water deliveries presented in this UWMP assume the interim M&I reliability policy remains in place and that M&I allocations in a repeat of 1977 would be at the same level as occurred historically in 1977.

Additional information on District banking, transfer, and reallocation agreements can be found in chapters 8 and 9.

4. IWRP Water Transfers/Additional Recycling

The preferred strategy calls for contracting with one or more parties to purchase long-term water transfers of up to 25,000 af/year within the next 10 years. Alternatives include contracts for either dry-year options or entitlement transfers. If future projections indicate that the year 2020 water demand may exceed 450,000 af/year, an additional long-term transfer of up to 25,000 af/year may be appropriate before year 2020. The timing for securing such additional supplies depends on where future water demands appear to be falling within the demand planning range and on the water transfer opportunities that arise. As mentioned earlier, additional water recycling (if it develops) may substitute for some or all of the water transfer components in the preferred strategy. A discussion of transfer opportunities is included in Chapter 10.

5. Water Banking

The District's local and imported water supplies in LTA and wet years exceed the current and projected water demands. In dry years, however, shortage can occur. To address this vulnerability, the preferred strategy called for securing 100,000 af of water banking storage to be developed immediately, with as much as an additional 250,000 af to be developed later depending on increases in future demands.

On April 1, 1997 the District's Board took two actions regarding water banking. The Board directed staff to pursue a diversified water banking strategy that would include participation in multiple water banking programs to improve the District's water supply reliability, and be consistent with the water banking component of the IWRP. The Board also developed guidelines to be used by staff in developing water banking opportunities.

Consistent with the adopted water banking guidelines and the preferred strategy, the District has entered a long-term agreement with the Semitropic Water Storage District (Semitropic) for participation in its Groundwater Banking and Exchange Program. The agreement reserves for the District up to 35 percent of the Semitropic program capacity, or 350,000 af of the total 1,000,000 af storage capacity.

Because of current take restrictions, the amount of water that can be withdrawn from the bank in the CDP is only about 52,000 af/year at the 350,000 af participation level. In a repeat of 1977 hydrology, only 31,500 af of water will be available with a 350,000 af bank. A more thorough discussion of water banking in general and this agreement in particular is included in Chapter 9.

D. Total Water Supply and Use

With implementation of the preferred strategy, the District has sufficient water supplies to meet the needs of the County through year 2020 under all four of the water supply scenarios discussed in this chapter, assuming the groundwater storage at the beginning of a drought event has not been seriously depleted by previous events.

Figure 5-4 summarizes the water supplies that can be expected with existing facilities and agreements for the different hydrologic conditions considered, and compares the supplies to the year 2020 demand projections. The figure shows that the water supplies exceed demand in wet years and over the LTA. With implementation of the IWRP Preferred Strategy in place, the ability of supply to meet demand during the CDP or a Single Dry Year depends on the quantity of water stored in the groundwater basin and water bank at the onset of such an event.

Figure 5-4
Santa Clara County Water Supply
Average Values for the Hydrological Period
(af/year)

		Wet	**LTA**	**CDP**	**Single Dry Year**
Local Supplies	Surface Water Yield[1]	155,000	101,000	59,000	50,000
	Natural Groundwater Recharge	225,000	112,000	74,000	0
	Recycled Water	20,000	20,000	20,000	20,000
	Change in Storage[2]	Adds to Storage	Adds to Storage	0 to 45,000 from Storage	0 to 300,000[7] from Storage
Imported Supplies	SWP	100,000	74,000	47,000	11,000
	CVP	152,500	125,000	110,000	55,500[8]
	Hetch-Hetchy[3]	76,000	63,800	52,900	36,900
	Additional Water Transfers or Recycled Water[4]	0 to 50,000	0 to 50,000	0 to 50,000	0 to 50,000
	Water Banking[5,6]	Adds to Storage	0	15,000 to 52,000 Withdrawal	8,200 to 31,500 Withdrawal
Total Available Supplies		**729,000 to 779,000**	**496,000 to 546,000**	**378,000 to 510,000**	**182,000 to 555,000**
2020 Water Demand		420,000 to 480,000	420,000 to 480,000	420,000 to 480,000	420,000 to 480,000

[1] Includes Stanford and SJWC supplies.
[2] Depends on groundwater storage at start of drought event.
[3] Estimated based on historical usage.
[4] Quantity of supply depends on timing and implementation of the IWRP Preferred Strategy.
[5] Quantity of banked water depends on timing and implementation of the IWRP Preferred Strategy.
[6] Water bank assumed full at beginning of drought event.
[7] Maximum pumping rate limited by subsidence risk.
[8] Estimated based on 50 percent of M&I historical use.

Chapter 6
Water Supply Deficiencies and Risks

This chapter describes the ability of the County's water supplies to meet needs in the Critical Dry Period (CDP) and other times of water shortage. The chapter also describes other risks and uncertainties in the water supply outlook, and identifies District activities to mitigate these risks.

A. Meeting the Needs of the Critical Dry Period

As described in Chapter 2, in the past the District has foreseen the need for additional water supplies for its rapidly increasing population, and has succeeded in securing long-term imported water supply contracts and making system improvements to meet demand.

The District recently began implementing the IWRP Preferred Strategy to meet the County's long-term water needs. When fully implemented, the preferred strategy will meet water demands up to 500,000 af/year through 2020, assuming the hydrology experienced contains no event worse from a water supply perspective than the CDP. As explained in Chapter 5, the CDP is equivalent to the 1987-1992 drought extended to a 10-year duration event with a calculated severity of 1 percent.

B. Potential Deficiencies beyond the Critical Dry Period

A risk of shortage remains even after the preferred strategy has been implemented. To assess this risk, the District conducted the IWRP Preferred Strategy Statistical Analysis. In this analysis, the historical record was randomly sampled to generate a trace of 100,000 years of water supply data. Figure 6-1 summarizes the frequency and severity of drought shortages that occurred in this 100,000-year series. Shortage was defined as the amount of water demand that could not be met from existing sources including storage, e.g., the quantity of additional supplies or mandatory demand reduction measures that may be required if land subsidence is to be avoided.

Figure 6-1
Shortage Events in the 100,000-Year Simulation

Demand (af)	Shortage Event Count	No. of Years of Shortage	Shortages < 100,000 af	Shortages >100,000 & <200,000 af	Shortages >200,000 af	Worst Case Shortage (af)
400,000	321	516	293 (0.3%)	211 (0.2%)	12 (0.01%)	233,000
450,000	415	668	414 (0.4%)	226 (0.2%)	28 (0.03%)	274,000
500,000	1,154	2,069	1,551 (1.6%)	412 (0.4%)	106 (0.1%)	313,000

As illustrated in the table, at a 500,000 af demand level, shortages can be expected about 2 percent of the time. In some cases, the expected shortage was severe – up to 313,000 af (or over 60 percent of the demand level) in the worst year observed in the simulation.

This analysis showed that the IWRP Preferred Strategy is effective in meeting water demands during long drought events (7 or more below-average years), such as the 10-year CDP design event used in the IWRP. Very severe short duration events can result in significant shortage, however. The report recommended further investigating management strategies for responding to such events. These strategies are discussed in Chapter 7.

C. Other Risks and Uncertainties in the Water Supply Outlook

The characterization of the District's water supply outlook that was presented in Chapter 5 is based on numerous assumptions, and there is a risk that expected conditions may not occur. The climatic, regulatory, and political forces which shape the availability of water throughout California are numerous and ever-changing, and can affect the availability and reliability of future water supplies. System vulnerabilities and operational concerns also lend uncertainty to the water supply outlook.

These and other issues are described below. Some of the many water supply and management projects that address these risks are described briefly in this chapter and more thoroughly in Appendix B.

1. Additional Hydrologic Uncertainties

Hydrologic uncertainties influence the projections of both local and imported water supplies. The analysis of shortage is based on the annual fluctuations found in historically observed hydrology. However, from a climatic sense, the observed hydrologic record is short. Major cycles, such as the extended wet and dry periods of the previous centuries, and potential long-term changes, such as global warming, are not considered.

Even the IWRP Preferred Strategy Statistical Analysis described above assumes that future hydrology will be similar to that observed in the past—only the sequencing of the observed hydrology was altered. There is a risk that more severe drought events than have been historically observed may be experienced in the future. Even if the magnitude of annual precipitation were to remain the same as in the past, changes in the timing or form of that precipitation could have serious ramifications from a supply standpoint. For example, if global warming were to shift the precipitation in the Sierras from winter snowfall to rains, some of the storage capability of the snow pack would be lost, and yields to the SWP, CVP, and Hetch-Hetchy systems would be reduced.

The likelihood of such risks are unknown. The impact on the District's ability to meet County water needs if such events were to occur could be significant. It is important when evaluating alternatives to remember that the CDP is a design event that was selected given today's understanding, and it is not necessarily an event that will occur in the future—or even the worst event that may occur in the future.

A number of District activities and programs improve the reliability of District supplies, and reduce the District's exposure to the risks of hydrologic uncertainty. The banking and transfer agreements described in chapters 9 and 10 help increase District water supplies in years of shortage, as do District programs aimed at maintaining high levels of groundwater storage. Recycled water projects as described in Chapter 8 provide a water supply source that is largely independent of hydrology. The drought management strategy described in Chapter 7 guides the District's actions in years of water supply shortage, including those more severe than the CDP, which may be observed in the future.

2. Regulatory Actions

Regulatory actions that can impact local or imported supplies include potential additional listings under the federal and state Endangered Species Acts (ESA); Congressional mandates such as the CVPIA, the Clean Water Act, and the Safe Drinking Water Act; and State Water Resources Control Board water rights decisions (especially in the Bay-Delta area). This category of risk includes a number of potentially serious impacts to District water supply reliability.

The listings of the winter run Chinook salmon and the Delta smelt under the ESA have already had significant impacts on SWP and CVP pumping from the Delta. Pumping capabilities are restricted in months when resident fish populations are most vulnerable or migrating fish may be adversely impacted. For example, in the summer of 1999 the U.S. Fish and Wildlife Service ordered a reduction in pumping in the Delta to protect a threatened fish, the Delta Smelt. The Delta pumping restriction in June resulted in San Luis Reservoir storage being 400,000 af lower than expected, causing serious concern that in later summer months the reservoir would be too low to allow pumping to serve the Santa Clara County. When the reservoir level reaches approximately 300,000 af, water quality suffers dramatically, due to algae on the water surface. When reservoir levels drop below 200,000 af, the quality is unacceptable for treatment and consequently, the District suffers a CVP supply interruption. Thus, there can be significant public health and safety risks associated with regulatory actions affecting San Luis Reservoir.

The District's CVP supplies are also negatively impacted by the U.S. Department of the Interior's (DOI) October 1999 decision on the accounting of CVPIA's environmental provisions. In addition to dry-year supply impacts, the DOI's decision would also reduce average and wet-year supplies to the District. Consequently, the District would have less "excess" supplies available to be banked or stored for dry-year use.

The responsibility for meeting Bay-Delta standards is currently being borne by the two major water projects, the SWP and the CVP. Other water diverters that impact the Delta may ultimately share some of this responsibility, resulting in a yet-to-be-defined reduction of flow responsibilities to the SWP and CVP. In this UWMP, it is assumed that the SWP and CVP will continue to bear the burden of the 1995 Water Quality Control Plan, i.e., an indefinite extension of the December Delta Accord. Changes to Bay-Delta standards are a virtual certainty, but the details of those changes are unknown at this time.

Local supplies are also subject to regulatory uncertainty. Although the 1996 court order setting minimum flows on the Guadalupe River expired in 1999, the District has continued to provide these flows this year. To address water rights complaints filed with the State Water Resources Control Board, the District initiated the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). FAHCE is a multi-party dispute resolution process that involves state and federal regulatory agencies as well as local environmental interests. The process is working to resolve the water rights complaint through collaborative scientific studies designed to identify the impacts of District water supply operations on anadromous fisheries and to develop strategies to minimize these impacts.

As described below under institutional and political uncertainties, the District participates in a number of liaison and participatory activities including the CALFED process. In addition, a number of District projects address regulatory concerns and uncertainties.

3. Institutional and Political Uncertainties

Institutional and political uncertainties are risks due to changing institutional structures or political climates. In part, the CVPIA could be considered a result of changing political climates at the federal level. Uncertainty over the implementation of the CVPIA remains, despite recent court decisions on DOI's accounting methodology due to the complex, overlapping sets of regulatory requirements under CVPIA and CALFED.

The CALFED Bay-Delta Program issued a document titled "California's Water Future: A Framework for Action" in June 2000. The Framework document provided a 4-year assurance that includes regulatory baseline in conjunction with the establishment of an Environmental Water Account. This regulatory baseline includes implementation of CVPIA's environmental water, or the so-called b(2) provisions of the 1994 Delta Accord. The framework provides the commitment that there will be no reductions, beyond the baseline regulatory levels, in Delta exports to State and Federal Project water users resulting from measures to protect fish. It is unclear, however, if these regulatory assurances will be extended beyond the 4-year term.

To stay abreast of institutional and political changes, the District coordinates with other agencies and coalitions and advocates for District water supply and quality interests in regulatory and political arenas. The District's Government Relations Unit coordinates timely communication and advocacy of the community's water-related interests with the U.S. Congress, State Legislature, state and federal regulatory agencies, and local governments. In addition, the Imported Water Unit liaisons with the DWR and the State Water Contractors regarding SWP issues and operations and with the Bureau regarding CVP issues and operations. The District plays an active role in resolving Bay-Delta issues, improving source water quality, and strengthening agreements among state and federal agencies and various water users to increase overall reliability of supply. The District is actively participating in the CALFED process and other related processes.

4. Implementation Uncertainties

Implementation uncertainty refers to the risk of being unable to achieve full implementation of planned projects or programs.

For example, there is a risk that water savings from the District's conservation programs will not meet program goals. The success of the conservation program depends on resident and business participation. In addition, because of the current flow cap limiting the San Jose/Santa Clara Water Pollution Control Plant's discharges of treated wastewater to the South Bay, the City of San Jose's Water Efficiency Program is aggressively pursuing indoor water conservation. If the Plant's discharge flows remain under the maximum specified in the flow cap requirement, it is likely that the City will decrease its program intensity and funding commitment. Currently the District's program relies on a high level of effort from the City of San Jose and tributary service areas. The District may need to augment or redesign certain programs to ensure regional implementation of and compliance with Water Conservation Best Management Practices.

A successful monitoring and evaluation program can minimize the risks associated with water conservation programs. The focus of the current monitoring effort has been the tracking of activity levels and program costs. In order to ensure future savings goals are achieved, the District should enhance its existing monitoring program to more rigorously quantify actual water savings; such changes are described in Chapter 11. In addition, the District's projections regarding water use reductions and underlying assumptions will be reassessed during the Water Conservation Baseline Study, also described in Chapter 11.

Another uncertainty is that recycled water projects will not be implemented at expected levels. Only currently operational recycled water projects or planned projects with high levels of implementation certainty are included in the current water supply projections; however, the District cannot guarantee these projections will be implemented since recycling projects are developed by the wastewater treatment plants in the County, not the District directly.

The successful expansion of numerous other recycled water programs within the state of California is crucial to the success of the District's program. As these programs become more visible and successful, they will make the obstacles involved in local programs easier to overcome. For example, increased use of recycled water for agriculture statewide could help overcome the reluctance of local farmers to use recycled water and would provide assurance that food processors and large-scale markets would not reject farmers' produce as unacceptable. Another example is recycled water for dual plumbing of commercial, industrial, and high-rise residential buildings. If projects in other communities are unsuccessful or create negative publicity, efforts to expand the program in Santa Clara County may be affected.

To address these risks, the District uses conservative projections of countywide use of recycled water, while recognizing that additional recycled water may be developed and could offset the need for additional water transfers in the future. The IWRP Preferred Strategy calls for the future development of up to 25,000 af of additional recycled or transfer water. If the water recycling potential expands beyond the District's conservative projections, the need for future transfer water will be reduced. Such flexibility in designing future programs helps offset program implementation risks.

5. Technical Assumption Uncertainties

Analyzing projected water supplies and demand requires a number of technical assumptions. These assumptions include the demographic projections and future water use patterns that underlie the water demand projections, and estimates of the groundwater storage capacities and natural groundwater yields that help characterize the groundwater resource.

Making technical assumptions is necessary in any analysis but does present a risk. As an example, the technical assumptions in the demand projection anticipate adherence to the County and City General Plans and stability of the regional economy. But general plans are volatile documents that change often, and the economic and business climate is subject to national and international influences that are difficult to anticipate.

Given the large uncertainty in water demand forecasting, a demand range was adopted for the District's water supply planning activities. The likelihood that the actual future water use will lie outside the planning range is believed to be very small. By designing flexible water management plans that can adjust as the future projection changes, the risk of the future water supply falling short of or exceeding the actual water demand is minimized. The District is currently collecting data on use by customer class from its retailers so that the understanding of water use patterns and water demand can be refined.

As for other technical assumptions, the best information and technology available has been used. The District continues to refine its analyses and gather new data to improve its technical assumptions. For example, the District has re-analyzed the operational storage capacity for the Santa Clara Valley groundwater basin, changing the estimate from 250,000 af to 350,000 af of usable storage capacity.

6. Operational Risks

There are some risks that District system operations may change in the future, due to changes in

District priorities or modifications to the system that alter its capacity to convey, treat, or deliver water. For example, water supply and flood control objectives conflict when it comes to reservoir operations. The District's local reservoirs were built as water supply facilities and are operated to maximize the beneficial yield for water supply. Only the Anderson/Coyote system is operated for both water supply and flood control objectives. If the District were to re-operate local reservoirs to keep storage levels down so that flood control storage space was provided, the beneficial yields of the reservoirs would decrease.

The District is analyzing the advantages for flood management and the impacts on water supply yields that would result from changing reservoir operations. Some modifications can be made without adversely impacting water supply, while other changes can reduce needed reservoir yields. This investigation has not been completed as yet, and changing the balance between these two competing District objectives would require policy input from the District's Board. Before District operations are modified, the ramifications of such changes are carefully explored.

7. System Vulnerability

In addition to water supply shortages caused by drought, the District's ability to meet the needs of the County can also be impacted by catastrophic interruptions of water supply, including regional power outages, earthquakes, contamination, flooding, and other natural or man-made disasters.

The District incorporates such concerns in the planning and operations of its facilities. One example is the District's Treated Water Improvement Projects, now under way. These projects will help the District ensure that its treated water meets current and future health, safety and quality standards required by customers and by regulations (i.e., the Enhanced Surface Water Treatment rule mandated by the United States Environmental Protection Agency). As part of this project the District is making modifications to its three WTPs for greater seismic reliability, and providing landslide mitigation at its Penitencia WTP. The District is also implementing an inter-tie with the San Francisco Water Department's pipelines, which would allow water transfers between the two systems in the event of an emergency.

In addition, the WTPs each have backup generators in case of power outage, and treated water can be gravity-fed from the plants' clearwells to the distribution system. The backup power at the District's raw water pumping plants is insufficient to pump water through the raw water transmission system; however, raw water can be gravity-fed into the system from Anderson reservoir in a power outage, if necessary.

The District also maintains spare parts and the equipment necessary for emergency repairs to its pipelines and treatment plants. Spare sections of pipe ranging in size from 24" to 144" in diameter are stored locally to facilitate replacing damaged sections quickly, and sufficient spare parts are maintained to replace a water treatment plant flocculator if necessary. Approximately two weeks of chemical supplies are stored for the treatment plants, protecting against possible supply distribution problems that may result in a catastrophe.

In addition to such system modifications, for many years the District has maintained and operated an Emergency Operations Center (EOC), which is activated in response to earthquakes and flooding events that impact District operations. Recent disasters, coupled with evolving state and federal mandates for increasing complexity in disaster operations management, necessitated a formal, high-level, focused approach to prepare for, respond to, and recover from disasters. In 1994, a major project was initiated by the District to design, develop, and implement an operational unit with the capability to manage District-wide emergency preparedness planning, training, and EOC exercises. In 1998, the project transitioned into an ongoing operation with the recruitment and appointment of a professional emergency manager.

The District now maintains the EOC in a perpetual state of operational readiness; develops and tests emergency operations plans; conducts emergency response training; and maintains effective liaison with local, state, and national emergency management organizations and external agencies. The EOC has been modernized to meet the standards of the California State Office of Emergency Services' Standardized Emergency Management System (SEMS) and Response Information Management System (RIMS). All EOC staff have completed SEMS and California State Office of Emergency Services-mandated Incident Command System (ICS) emergency preparedness and response training.

District staff for crucial functions are on call in case of emergencies. Emergency operations plans have been developed for critical functions such as the water treatment plants, including rapid notification programs and personnel responsibilities in case of emergencies. In case of earthquake, staff are assigned to various locations, such as plants and reservoirs, to inspect the facility and report on the situation to the EOC. A helicopter is also available for visual inspections of remote facilities after catastrophic events.

8. Infrastructure Risks

Infrastructure risks are similar to system vulnerability risks, but have permanent consequences. Land subsidence, salt water intrusion, or major groundwater contamination all could potentially permanently impact the County. For example, the District currently is studying the nitrate problem in the South County groundwater basin. If the District program is unsuccessful in addressing this water quality concern, or some other water quality contamination is identified that makes the groundwater basin unusable as a source of supply, the District could lose 100,000 af of usable groundwater storage, 45,000 af of natural groundwater recharge, and over 20,000 af of surface water yield. Since the groundwater basin is currently the only supply in South County, such a loss would be devastating.

To address such infrastructure risks, the District has a number of water quality and monitoring programs which maintain awareness of conditions in the groundwater basin and address possible problems before permanent damage is done to the groundwater resource. For example, the District has groundwater elevation monitoring, land subsidence measurement, and groundwater quality monitoring programs to identify potential problems early. Programs to address potential risks to the groundwater basin include the Wellhead Protection programs, the Nitrate Program and the Leaking Underground Storage Tank Oversight Program. These programs are described in more detail in Appendix B.

Chapter 7

Contingency Planning

As described earlier, the IWRP Preferred Strategy was designed to meet demands up to year 2020, assuming no hydrologic shortage worse than the CDP is experienced. The CDP is equivalent extending the 1987-1992 drought to a 10-year drought with a 1 percent probability of occurrence. However, there remains some risk of more severe conditions, which can lead to shortage even with the IWRP Preferred Strategy in place.

This chapter describes the District's contingency planning for actions that can be taken should shortage occur. A strategy for early drought recognition and response is presented, and shortage response levels and stages of action are described. The demand range used in these analyses was the demand range for planning presented in the 1997 IWRP Final Report. Thus, the District's contingency planning considers three water demand and supply scenarios, corresponding to the three action levels of the IWRP Preferred Strategy: minimum action level (400,000 af demand), intermediate action level (450,000 af demand) and maximum action level (500,000 af demand).

A. Background

District planning for water reliability during shortages is in keeping with the Board of Directors Ends Policies, specifically:

1.1.2. The water supply is reliable to meet current demands.
1.1.3. The water supply is reliable to meet future demands as identified in the District's IWRP process.

Another important Ends Policy influences District water management actions in all years, but especially in years of shortage and drought:

1.2.2.3 Groundwater supplies are sustained.

In addition to the risk of not meeting District reliability goals and experiencing unmet demand, the risks from water supply shortages include overdrafting the County's groundwater basin and experiencing land surface subsidence. Land surface subsidence can damage infrastructure and lower the land elevation along the County's many rivers and streams, resulting in greater backwater influences from San Francisco Bay and greater flooding risks among densely developed urban areas.

In its shortage contingency planning, the District strives to minimize the frequency and magnitude of drought response (whether that be customer cutbacks or additional supply purchases) while avoiding possible land subsidence due to over-extraction of groundwater storage.

As described in Chapter 6, statistical analysis of the IWRP Preferred Strategy showed that the strategy is effective in meeting water demands through year 2020 during long drought events (7 or more below-average years) such as the CDP; however, very severe short duration events can result in significant shortage. The analysis recommended further investigation of management strategies for responding to such events. Much of the analysis presented in this chapter is in response to that recommendation.

B. Early Recognition of Water Shortage Due to Drought

Not all hydrologic dry years lead to water supply shortages and groundwater overdraft. In an average or wet year, the County's water supply sources exceed the County's water needs. The District carries-over water from wet years in groundwater storage and the water bank for use in dry years. In severe droughts, available supplies and carried-over storage may be insufficient to meet demand, and either additional measures must be taken, demand goes unmet, or groundwater overdraft occurs. Shortage was defined as the amount of water demand that could not be met from existing sources including storage, e.g., the quantity of additional supplies or mandatory demand reduction measures that may be required if land subsidence is to be avoided.

In addition to preparation, an important part of meaningful drought shortage response is the ability to recognize a shortage when it occurs: preferably early enough into the event that most options remain available, and before supplies that may be crucial later have been overly depleted. The earlier the warning is sounded on such events, the more likely it is that the District will be able to take planned and measured actions to mitigate for the supply shortfall. The larger the need for cutbacks or supplemental water, the harder it may be to meet that need in a short time frame. The District has developed several tools to ensure early recognition of water shortages due to drought.

1. End-of-Year Carryover Storage Indicator

The District has performed operational analyses to determine what parameters may serve as warnings of potential shortage. Based on these analyses, groundwater end-of-year carryover storage was the most successful in anticipating water shortages in the following year. When the operational storage in all the groundwater subbasins combined drops below 350,000 af, compared to a full capacity of 500,000 af, then the following year is considered to be at risk of water shortage. The indicator is quite conservative: it considers about 1 in 5 years to be a potential first year of water shortage, compared to 1 in 20 years that actually can be expected to result in shortages.

This indicator is expected to successfully anticipate 97 percent of years with water shortage. It is even more successful in anticipating larger, more serious shortages. In the simulations, the indicator was 100 percent successful in anticipating shortages over 100,000 af, and 99.8 percent successful in anticipating shortages over 50,000 af.

2. 2-Year Planning Horizon for Shortage Response

By looking at a 2-year planning horizon, actions can be taken early to help reduce the severity of subsequent shortages should the drought continue beyond the first year. By assuming that the water supply in the second year of the planning horizon is equivalent to the supply that would be available if there were a repeat of the worst year of record, the risk of overdrafting the groundwater basin in later years can be minimized. The action plan presented in Figure 7-2 is designed to keep sufficient groundwater carryover storage at the end of the first year to maintain a 50,000 af reserve in the second year.

C. Responses to Anticipated Shortages

As mentioned above, the end-of-year groundwater carryover storage for this year can be used to anticipate a risk of water supply shortage in the following year. But what then? Some actions to reduce the severity of anticipated shortages are described below. (As a wholesaler, the District works closely with local retail water agencies and cities to implement drought response measures.)

1. Multiple-Year Shortage Response

The discussion thus far has focused on recognizing the onset of a drought and on drought response in the first identified year of a drought. What about subsequent drought years?

The 2-year planning horizon is a running construct, not an actual 2-year interval. In each drought year, water supplies and groundwater conditions are monitored. As estimates of the yearly water supply and resulting end-of-year groundwater carryover storage become available, recommended action levels for that year’s drought response are selected based on the drought response plan. When the current year is completed, the clock is reset. The current year is always the first year in the 2-year planning horizon, regardless of whether it is the first or fourth or tenth (or whatever) year of drought.

The 2-year planning horizon assumes that any response taken in the first year is repeated in the second year as well. For example, if demand reduction measures are required in the first year and the second year is assumed to be drier still, those demand reduction measures are assumed to continue in the second year. By following these action levels, the groundwater carryover storage at the end of the 2-year planning horizon will remain above the 50,000 af minimum considered prudent to protect against subsidence.

2. Shortage Response Action Guidelines

The following shortage response action guidelines for different expected end-of-year carryover groundwater storage levels are based on the 2-year planning horizon concept described above, and on maintaining a minimum of 50,000 af of groundwater storage above the subsidence threshold at all times. The actions at the lowest two storage levels are greater than a strict interpretation of the design criteria would suggest, in recognition of the difficulty in maintaining that level of drought response for multiple years.

In early April each year, when the quantities of imported water available under the District’s contracts for the year have been determined and estimates of local water yields for the water year are fairly reliable, an estimate of the end-of-year carryover storage in the groundwater basin should be made. If it is expected that the water year will end with less than 350,000 af of carryover groundwater storage, the coming year should be considered at risk of being a drought year. The water supply situation should be monitored and arrangements made to bring in dry-year option water the following year if the projections do not improve. If the expected end-of-year carryover is less than 250,000 af, the current year should be considered a drought year and dry-year option water should be brought in if possible.

The table below summarizes the recommended shortage response guidelines for different expected end-of-year groundwater carryover storage, after IWRP implementation.

Figure 7-2
Shortage Response Action Guidelines

Level	**Expected End-of-Year Groundwater Basin Carryover Storage, with IWRP Supplies in Place (af) {500,000 basin capacity}**	**Recommended Shortage Response: Total Over the 2-Year Planning Horizon**	**Response as a Percent of Demand Level**	
			450,000 af	**500,000 af**
--	350,000 to 500,000	No Action		
1	320,000 to 350,000	Initiate Voluntary Water Demand Reduction/Public Outreach Program (including media campaign and increased water conservation literature and conservation kit distribution)	Cannot be Quantified	Cannot be Quantified
2	270,000 to 320,000	Implement additional 50,000 af response	6%	5%
3	220,000 to 270,000	Implement additional 100,000 af response	11%	10%
4	170,000 to 220,000	Implement additional 150,000 af response	17%	15%
5	120,000 to 170,000	Implement additional 200,000 af response	22%	20%
6	50,000 to 120,000	Pursue both additional supply and demand reduction measures to achieve at least an additional 270,000 af response	30%	27%

The shortage response action guidelines do not specify the form of the drought response, whether it be state drought bank water, spot market purchases, CVP hardship water, or water demand reduction. To reduce the frequency of unnecessary responses, it is recommended that the actions for the first three levels (responses of up to 100,000 af) be implemented in the second year as conditions warrant. Responses greater than 100,000 af may be spread over the first and second years, depending on available opportunities.

4. Mandatory Prohibitions

The District does not have the authority to adopt ordinances or impose mandatory provisions restricting the wasteful use of water. However, the District has developed model water use prohibitions and restrictions and has worked closely with local agencies to encourage their adoption.

As a wholesale supplier of water for Santa Clara County, the District has no authority to set or enforce consumption limits at the retail level. As a result, this UWMP does not include per capita allotments, inclining-block rates, penalties, or incentives for demand reduction for any customer class. The development of such mechanisms is solely within the purview of the local retail water agencies.

The District works with local retail water suppliers to establish water use reduction targets. By working closely with its retail water agencies, the District has effectively set and achieved up to 25 percent mandatory rationing levels in the past.

5. Penalties or Charges for Excessive Use

The District Act (Section 26.5) was amended in 1989 to allow the District to develop overproduction charges for groundwater pumping. This provision allows the District the flexibility to use pricing as an incentive to achieve cooperation on the part of local water users during a water supply shortage to avoid land subsidence. The District's Board has the ability to define acceptable production levels upon a finding by the Board that conditions of drought and water shortage require increased charges.

6. Revenue and Expenditure Impacts

Two mechanisms are in place that help the District mitigate the financial impacts of water supply shortages. The District maintains a Supplemental Water Supply Appropriation which sets aside funds that can be used to implement IWRP Preferred Strategy components and to purchase additional water when needed. The District also maintains a Rate Stabilization Reserve to assist in avoiding frequent water rate adjustments.

7. Mechanism for Determining Actual Reductions in Water Use

As a wholesaler, the District does not have access to individual water use account data that would enable it to determine the reductions by customer class or by customer unit (per household, for example.) This data is only available at a retailer level.

However, in times of shortage the District produces a monthly Water Supply and Use Report that contains the following:

- Monthly and season-to-date rainfall at four rainfall stations within the County.
- Reservoir storages and capacities.
- Monthly recycled water deliveries.
- Monthly and year-to-date water use for each major water retailer in the County.
- Groundwater basin condition (depth-to-water data).

The report shows how the total major retailer year-to-date water use compares to the prior year water use. During times of shortage, the current water use by retailer is compared with water use targets.

D. An Example: Three Dry Years Scenario

The Act requires an estimate of the minimum water supply available during each of the next 3 years, assuming a repeat of the driest 3-year historic sequence. In the 125-year record for the San Jose rainfall gage #86, the driest consecutive 3-year sequence occurred from 1987 through 1989. Figure 7-3 summarizes the water supply that could be expected in a repeat of those 3 years.

As the figure shows, the District would be able to survive this 3-year sequence without shortage if it were to be repeated following the year 2000. The District has almost 142,000 af stored in the Semitropic water bank, and the District's groundwater basins are nearly full. The groundwater basin storage would remain above the end-of-year carryover storage levels described above, so no actions would be necessary during this dry-year sequence. If this 3-year sequence were to occur in a future time when storage levels are not as high, this outlook would change.

Figure 7-3
Water Supply Estimates for the Driest 3-Year Sequence
(af)

		Year 1 (1987)	**Year 2 (1988)**	**Year 3 (1989)**
Local Supplies	Local Water Yield[1]	96,300	61,900	37,400
	Natural Groundwater Recharge	31,600	54,800	151,700
	Recycled Water	2,700	5,000	7,000
Imported Supplies	SWP	45,000	35,000	64,000
	CVP[2]	129,600	110,000	112,800
	Hetch-Hetchy[3]	72,500	54,400	54,400
Annual Supply Subtotal		377,700	321,100	427,300
Estimated Demand		400,000	400,000	400,000
Annual Supply Shortfall		22,300	78,900	None
Storage Withdrawals	Water Banking	13,610	12,030	16,612
	Groundwater Withdrawal	8,690	66,870	Gain

[1] Includes local recharge and SJWC supplies.
[2] ***Estimated assuming 75% of contract entitlement for M&I supplies.***
[3] Estimated based on historical usage.

Chapter 8
Water Recycling Opportunities

This chapter describes current and proposed recycling programs in the County, including the South Bay Water Recycling Program, the Sunnyvale Water Recycling Project, the South County Regional Wastewater Authority activities, and the Palo Alto Recycling Project. The role of water recycling in the District's IWRP is discussed, as well as the recycled water goals adopted in 1999 by the District's Board of Directors.

A. Background

Recycled water is one of the key components of the District's water supply mix. The IWRP Core Elements include a baseline amount of 14,000 af/year of recycled water by year 2020, and an additional 6,000 af of recycled water adopted as part of the IWRP Preferred Strategy. The IWRP Preferred Strategy includes up to an additional 25,000 af/year of recycled water or water transfers per year. The analysis of costs and potential options of water recycling versus water transfers will be conducted in the IWRP update, which is expected to be completed in 2002.

In the last few years the District's Board has reaffirmed its commitment to recycled water. In July 1997, the Board passed Resolution No. 97-60, which updated previous resolutions in support of the expanded use of recycled water. During 1997, the Board increased its financial incentive for the use of recycled water from $93 per af to $115 per af. This financial assistance applies to recycled water used to supplement the County's water supply and replace firm water demands that are presently met by supplies from the District. Partnership agreements now being developed with each of the cities owning sewage treatment plants will help determine the fair share to be paid by water users to ensure that recycled water will be available in the future.

On December 21, 1999, the Board adopted the following water recycling Ends Policies:

1.1.6 Water recycling is expanded consistent with the District's IWRP within Santa Clara County.

1.1.6.1 By the year 2010, water recycling accounts for 5 percent of the total water supply in Santa Clara County.

1.1.6.2 By the year 2020, water recycling accounts for 10 percent of the total water supply in Santa Clara County.

The District and several local agencies in the County are participating in ongoing and expanding water recycling systems, most of which are designed for various forms of non-potable recycled water. Future uses for dual plumbing and advanced treatment of recycled water for indirect potable reuse are being studied for feasibility on both a regional and a local basis.

B. Historical and Projected Recycled Water Use

In 1997, about 2,000 af of recycled water was used for landscape irrigation in the County. With the completion of Phase I of the South Bay Water Recycling Project (SBWRP) in 1999, more than 5,000 af/year has been delivered for irrigation and industrial uses. The actual recycled water use within the County is shown in Figure 8-1.

Figure 8-1
Historical Water Recycling
(af/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
North County										
Palo Alto	400	400	400	384	400	328	400	200	60	60
Sunnyvale	22	22	22	22	22	92	92	0	100	639
SJ/SC	405	338	418	401	370	385	458	848	1,545	4,031
Subtotal	827	760	840	807	792	805	950	1,048	1,705	4,730
South County										
SCRWA	187	313	202	88	129	10	117	340	336	682
Total	**1,01**	**1,073**	**1,042**	**895**	**921**	**815**	**1,067**	**1,388**	**2,041**	**5,412**

Several non-potable water recycling projects are currently under development in the County by local agencies or the District. The IWRP estimated that these projects would produce approximately 20,000 af/year of non-potable recycled water by the year 2020. In addition, in 1999 the Board adopted a goal that by the year 2020, water recycling will account for 10 percent of the water use in Santa Clara County. Figures 8-2 and 8-3 show the projected recycled water use under these two scenarios. The non-potable projects underway in the County, as well as expanded or new projects that may be developed to meet the 10-percent goal, are described below.

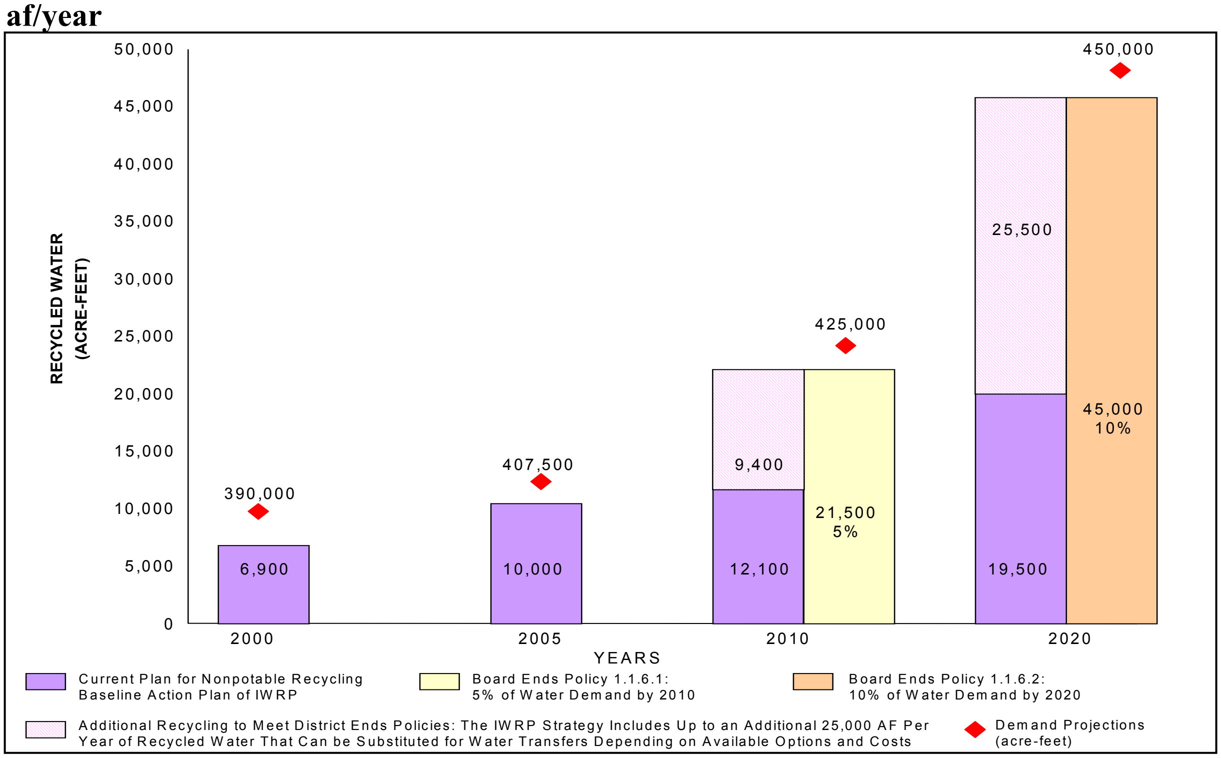
Figure 8-2
Summary of Water Recycling Projections
(af/year)

	Year 2000	**Year 2010**		**Year 2020**	
	Current	IWRP Baseline	Ends Policy 1.1.6.1	IWRP Baseline	Ends Policy 1.1.6.2
SBWR Phase I	6,000	8,000	9,000	9,000	10,000
SBWR Phase II	0	1,000	6,000	3,000	7,000
Sunnyvale	300	1,000	2,000	3,000	4,000
SCRWA	500	2,000	3,000	4,000	5,000
Palo Alto[1]	100	100	500	500	1,000
Indirect potable Reuse/Recharge /Blending/Agr Use		0	1000	0	18,000
TOTAL[2]	**7,000**	**12,000**	**22,000**	**20,000**	**45,000**

[1] The Palo Alto plan will supplant Hetch-Hetchy system water, not District water.

[2] The totals do not include possible environmental uses, such as streamflow augmentation.

Figure 8-3
Summary of Water Recycling Projections in Bar Chart Format
af/year



C. South Bay Water Recycling Program (Cities of San Jose, Santa Clara, and Milpitas)

The San Jose/Santa Clara Water Pollution Control Plant (SJ/SC WPCP) is a jointly owned regional wastewater treatment plant with a design flow capacity of 167 mgd. The plant effluent is tertiary treated to high quality standards, and can be reused for landscape and agricultural irrigation and industrial processes.

The South Bay Water Recycling Program (SBWRP) is part of a regional effort with the joint purposes of reducing freshwater discharges from the SJ/SC WPCP into San Francisco Bay wetlands and supplementing the long-range water supplies to Santa Clara County. The $140 million Phase I project, which was completed in 1999, includes construction of a transmission pump station, two in-line booster pump stations, one closed tank reservoir and 60 miles of pipeline. When fully operational, this system is expected to serve more than 200 customers for landscape irrigation, industrial uses and other purposes. The program is being funded by the cities of San Jose, Santa Clara and Milpitas and the five sanitary agencies whose wastewater is treated by the plant. The Bureau of Reclamation and the District are providing additional financial support.

In 1999, recycled water deliveries from this program were 4,500 af. Estimates for the year 2000 are for deliveries of 6,000 af. The system currently has the capacity to deliver up to 11,000 af/year.

As part of the SBWRP Phase II, planning has begun to expand delivery system capabilities to provide for deliveries of 7,500 af/year by the year 2005. Reasonable projections of recycled water production that will offset the use of District's water supplies are 8,000 to 14,000 af/year by year 2010 and 17,000 af/year by the year 2020. Other applications, such as streamflow augmentation and creation of wetlands, have not been included in the projections. The existing and proposed distribution system is shown in Figure 8-4.

D. Sunnyvale Water Recycling

The Sunnyvale Water Pollution Control Plant has a design flow capacity of 29 mgd for the treatment of wastewater from the City of Sunnyvale.

In 1997 the District entered into a Joint Participation Agreement with the City of Sunnyvale for the development and utilization of non-potable recycled water. Prior year deliveries of recycled water have been up to 220 af/year used mainly for landscape irrigation at Bayland Park and the city's Municipal Golf Course. Sunnyvale is now planning to expand their distribution facilities, which would provide for deliveries of 500 af/year by year 2000 and 1,000 to 2,000 af/year by the year 2010. The projection for the year 2020 ranges from 3,000 to 4,000 af/year.

E. South County Regional Wastewater Authority (Cities of Gilroy and Morgan Hill)

The existing South County Regional Wastewater Authority (SCRWA) provides wastewater treatment for the Cities of Gilroy and Morgan Hill. In 1994 a new 7.5 mgd secondary wastewater treatment facility was constructed; about 3 mgd of the secondary effluent is undergoing tertiary treatment to meet the higher standards required for reuse for irrigation and some industrial processes.

In 1977, the District, the City of Gilroy and the Gavilan Water Conservation District began a partnership to construct and operate a recycled water system extending from the SCRWA treatment plant southeast of Gilroy to several customers along Hecker Pass Road. Initially, this system delivered primary treated recycled water. Due to the low quality of the water and several recurring operational problems, the system has operated sporadically over the last 20 years.

In 1999, the District, the City of Gilroy, and SCRWA entered partnership agreements with SCRWA as supplier, the District as wholesaler, and the City of Gilroy as retailer to develop a water recycling project. This project will rehabilitate the existing pipeline and add additional pipelines, pump stations and a closed tank reservoir. This agreement, which was executed in 1999, will provide for the delivery of 500 af/year in 2000, and over 1,200 af/year by the year 2010. Future expansions of the treatment plant and the delivery system over the next 5 to 10 years could provide for expanded deliveries of recycled water to agricultural areas around Gilroy and to municipal and industrial uses north to the City of Morgan Hill. The present expansion plans project a conservative delivery of 4,000 af/year with up to 5,000 af/year by 2020. This project is shown in Figure 8-4.

F. Palo Alto Recycling Project (Cities of Palo Alto and Mountain View)

The Palo Alto Regional Water Quality Control Plant (PARWQCP) provides wastewater treatment and disposal capacity of 38 mgd for the cities of Palo Alto, Mountain View, Los Altos, and Los Altos Hills.

Currently the PARWQCP delivers 100 af/year of recycled water to the cities of Palo Alto and Mountain View. Based on the project alternatives recommended in their master plan, a total of 1,000 af/year of recycled water could be developed within the plant's service area by 2020. This recycled water is not expected to displace District supplies because this entire service area is supplied from the Hetch-Hetchy system, not from the District.

G. Bay Area Regional Water Recycling Program (BARWRP)

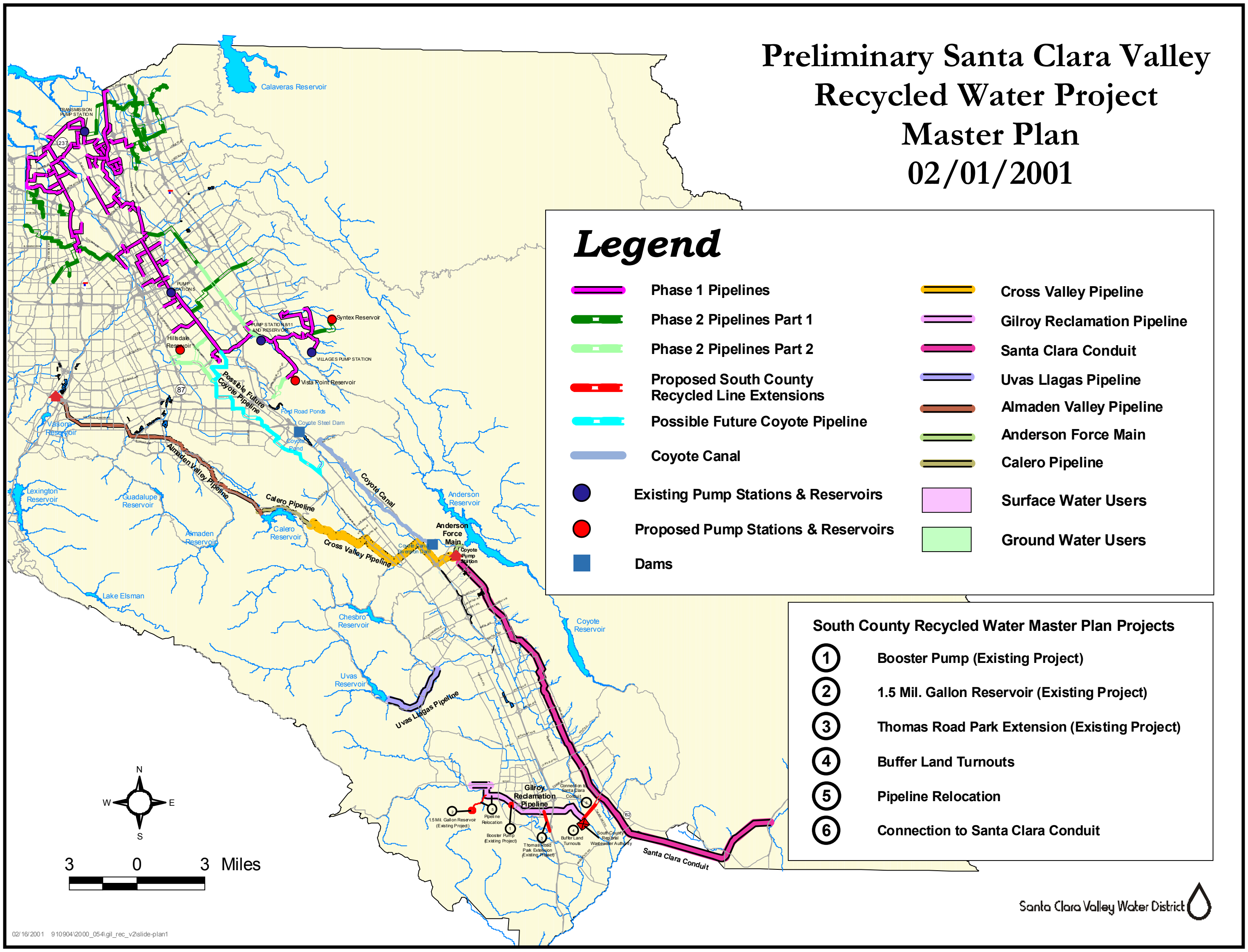
The BARWRP is a partnership of 17 Bay Area water and wastewater agencies, the California Department of Water Resources, and the US Bureau of Reclamation. This partnership is committed to maximizing the beneficial reuse of highly treated wastewater to provide a safe, reliable, and drought-proof new water supply. The product of the BARWRP efforts is a comprehensive regional water recycling master plan released in September 1999.

H. Additional Recycling to Meet District Ends Policies on Recycling

The Board's Water Recycling Ends Policies call for an additional 9,400 af/year by 2010, and 25,500 af/yr by 2020, over the baseline IWRP recycling programs. (See Figure 8-2.) To expand water recycling to these levels, the District will most likely need to actively promote and pursue local partnerships, invest in new capital, participate in various cost-sharing programs, make additional policy changes, and consider new strategies to remove barriers to expanded use. Figure 8-2 shows the increase in recycled water yield that may be achieved through additional participation by the District in the non-potable projects described above. Even with these increases, the programs described so far fall about 18,000 af short of the year 2020 goal of 10 percent supply from recycling.

One possible way to achieve the year 2020 goal is through indirect potable recycling. The District recently has initiated a study to investigate the feasibility of pursuing indirect potable reuse in the County. This would include using advanced treated recycled water of appropriate quality for groundwater recharge or surface reservoir blending and delivery to the District's potable WTPs. The study will be completed in 2001.

Figure 8-4. Recycled Water Project Maps (SCRWA and SBWRP projects)



Chapter 9

Water Banking Opportunities

This chapter describes the District's current water banking activities, such as participation in the Semitropic Groundwater Banking and Exchange Program, and the potential for additional banking opportunities.

A. Background

Water banking is an essential component of the IWRP Preferred Strategy. The IWRP calls for 100,000 af to 350,000 af to be developed by year 2020, depending on growth in the County water demand.

The basic concept of a water banking program is that one party transfers water to another during normal and wet years, and the water (or a portion of it) is transferred back again during dry years. Banking programs commonly involve either actual groundwater recharge of the banked water, or "in lieu" recharge through direct use of the surface water in place of groundwater pumping. During return years, groundwater or other supplies are used in place of surface water that is transferred back to the banking entity, and/or a certain amount of crop conversion or fallowing may occur. If the water transmission facilities exist, the return of water can be accomplished through the pumping and delivery (pumpback) of previously stored groundwater to the banking entity. Other types of banking can be based on shared use of surface storage facilities, or simply guarantees of return from future water year allocations or supplies.

Provisions of a water banking agreement generally include the sources and quantities of water to be banked; the period of time and available capacity in which banking and withdrawals can occur; provisions for conveyance and evaporation losses, and aquifer losses if water is stored in a groundwater basin; economic benefits and costs; and criteria regarding annual operation of the program.

A key feature of a banking agreement is the exchange ratio, or the water kept by the banking agent. Exchange ratios may be constant and fixed for the term of the banking agreement, or may vary depending upon the type of hydrologic year. Potential exchange ratios may be less than 10 percent to cover actual seepage and evaporation losses, in which case they are most likely accompanied by a significant monetary fee. Banking agreements in which a significant amount of water is left behind with the banking agent (covering more than physical program losses) may have lower fees than those in which most of the banked water is returned.

Other key features of banking agreements include the total capacity in which to store water (storage capacity), the capacity to put water into the bank (put capacity), and the capacity to take water out (take capacity). Any of these features can be a limiting factor in the use of the bank to meet dry-period needs. When the ability to put water into the bank is very limited, it can take many years to fill up the bank, and water available in wet years for banking may not be utilized. A limited take capacity can result in not being able to utilize all of the banked water in the dry years in which it is needed. The total amount of storage capacity is also important in meeting future needs, especially during sustained drought periods.

B. Semitropic Groundwater Banking and Exchange Program

In 1997, the District entered a long-term agreement with the Semitropic Water Storage District (Semitropic) for participation in their Groundwater Banking and Exchange Program. Like the District, Semitropic is a contractor of the SWP. Located northwest of Bakersfield, Semitropic obtains its SWP supply from the California Aqueduct through its contracts with the Kern County Water Agency. Semitropic has worked for more than 10 years to develop its groundwater banking and monitoring program. Semitropic has built capital facilities consisting of surface water distribution facilities, groundwater recharge facilities, and pumpback facilities to the California Aqueduct to accomplish the banking program.

In 1996, through a 1-year agreement with Semitropic, the District had delivered 45,000 af to the Semitropic program. The 10-percent distribution and evaporative loss resulted in a net amount of 40,500 af in storage. The participation through the 1-year agreement was rolled into the long-term agreement in 1997. Since 1997, the District has banked water in the program every year. The District now has almost 142,000 af of water banked in Semitropic. This water is available to be delivered back to the District in future dry years under the terms of the Semitropic agreement.

The District's agreement with Semitropic reserves for the District 35 percent of the program capacity, or 350,000 af of Semitropic's total 1,000,000 af storage capacity. The District has until January 1, 2006 to finalize its level of participation in the program. Rather than locking the District into a participation level, the agreement allows the District great flexibility in determining its final level of participation. The term of the Semitropic agreement is until the year 2035.

Under the agreement, a portion of the District's SWP entitlement will be delivered to Semitropic instead of the District in each year the District banks water. Most of the water delivered to Semitropic will be used by farmers in lieu of groundwater pumping; however, Semitropic does have the capacity to recharge up to 10,000 af/year to the groundwater basin. The District's 35-percent share of the program allows access to about 31,500 af to 110,000 af of the total annual put capacity, depending upon Semitropic's annual SWP allocation. A onetime distribution and evaporative loss of ten percent is applied when water is delivered to Semitropic for storage.

The future return of water will be accomplished either through an entitlement exchange, or through a pumpback and entitlement exchange. An entitlement exchange would involve a portion of Semitropic's SWP allocation being delivered to the District, in exchange for an equal quantity of the District's water remaining in the Semitropic groundwater basin. A pumpback and entitlement exchange would involve the DWR delivering water to the District, in exchange for an equal amount of the District's water stored in Semitropic's basin to be pumped out and delivered into the California Aqueduct for delivery to other State Water Contractors.

C. Other Banking Programs

As described above, 350,000 af of storage capacity has been reserved for the District in the Semitropic banking program, though the final level of vesting in the program has not yet been determined. This is the level of banking needed under the maximum action program of the IWRP Preferred Strategy. However, to help satisfy the Board's desire for a diversified water banking program, the District continues to investigate and work with other agencies regarding other potential banking programs. Such programs could provide additional benefits to the District such as increased operational flexibility or reliability, or may be less costly.

In 1997, the District entered into a Water Reallocation Agreement with the Bureau and other CVP contractors in the San Luis and Delta-Mendota Water Authority (SLDMWA). The purpose of the agreement was to establish a floor of 75 percent of the entitlement for the District's municipal and industrial (M&I) water from the CVP, and to minimize the impacts on CVP irrigation contractors. This agreement was identified in the IWRP as one of the core elements. As part of the Reallocation Agreement, the District and the participating CVP irrigation contractors committed to enter into negotiations for a water banking agreement. Preliminary analyses and discussions have taken place to begin scoping and quantifying the main provisions that would be include in a banking agreement. The general concept of this potential banking agreement is that of an "in lieu" program with a possible banking fee: in years when the District has water to bank, a portion of its CVP entitlement would be delivered for use in that year by the participating irrigation contractors in lieu of pumping additional groundwater. Based upon an agreed exchange ratio, a portion of that quantity of water would be guaranteed to be delivered to the District in dry years when requested. The water returned would either be the contractor's annual CVP entitlement or other sources obtained by the contractors for delivery to the District.

The District has investigated the feasibility of other potential banking programs, such as the Madera Ranch Project in Madera County. In addition to technical parameters such as capacity, recharge and extraction capability, there are significant institutional and political factors that must be considered. Of key concern is the support of neighboring landowners and water districts, and assurances that programs will be operated in a manner that protects their interests. Concern over groundwater banking and transfer activities has prompted some counties to pass ordinances addressing the conditions under which groundwater may be exported.

Chapter 10

Water Transfer Opportunities

This chapter explains long-term and short-term water transfers. It describes some water transfers in which the District has participated to increase water supplies in times of shortage, and describes a recent transfer opportunity the District has become involved in.

A. Background

Water transfers can generally be categorized as long-term or short-term. The two primary types of long-term transfers are: 1) water rights or water entitlement transfers; and 2) dry-year option transfers. Water rights or entitlement transfers involve purchasing an appropriative water right or contract entitlement from another SWP or CVP contractor. Some amount of imported supply would be available from the water transfer in every year, usually more in wet years and less in dry years. Such water right or entitlement transfers can be permanent assignments or can be for a defined period of time with options to renew.

Dry-year option transfers include entering into a contract with another party or parties to purchase additional imported water during dry periods. These agreements usually include an option payment due every year, with an additional amount payable in the years that the water is actually delivered.

Short-term, or spot-market, water transfers usually involve an agreement to purchase water within a one to two year period. Short-term water transfers can be obtained from the State Drought Water Bank, if one exists in the year water is needed, from other CVP or SWP contractors, or from independent water rights holders.

The preferred strategy included up to 50,000 af of long-term transfers by year 2020; however, short-term transfers were recognized as a possible contingency action to be used in response to a trigger event with a significant impact on either the IWRP baseline conditions or on the District's ability to execute the preferred strategy. The shortage response action plan described in Chapter 7 also recognizes that hydrologic droughts worse than the CDP are inevitable, and calls for short-term transfers to help make up the supply shortfall during such events.

B. District Transfers Historically

The District has made use of water transfers to increase water supplies in times of shortage several times in the past. Some of those experiences are described below.

1. State Drought Water Bank

In February 1991, as the State entered its fifth year of drought, Governor Wilson established the Drought Action Team. One of the recommendations of this team was to create an emergency Drought Water Bank (Bank) which could facilitate the purchase and transfer of water from areas of the state with excess supply to those areas in need of additional supply. DWR was responsible for operating the Bank.

During 1991, the Bank purchased a total of 820,805 af through 351 contracts for $125 per af. About 51 percent of water bank supplies came from fallowing farmland, 32 percent from groundwater, and 17 percent from stored water. About 400,000 af was sold to cities and water districts, and 270,000 af was stored in Lake Oroville for the following year. Most of the remaining 160,000 af was used to maintain Delta salinity standards. The District purchased 19,750 af from the Bank for $175 per af at the Tracy Pumping Plant. Additional conveyance costs were $50 per af, for a total cost of $225 per af.

In March 1992, Governor Wilson announced the continuation of the Drought Water Bank, and over 143,000 af of water was purchased for $50 per af. The District did not participate in the 1992 State Drought Water Bank. In 1993, water supplies available throughout the State increased substantially, and it was not necessary to establish a Bank. In 1994, the Bank was activated again, and the District purchased 5,000 af from the Bank at the cost of $50 per af plus conveyance costs.

The Bank demonstrated the effectiveness of transfers to meet short-term water needs, and it is likely that a modified form of the Bank will continue in the future as a mechanism to facilitate short-term transfers during drought years. One important impact that the State Drought Water Bank had on the short-term transfer market was that it stabilized the price of transfer water. For future banks, it is likely the DWR will have to complete additional environmental documentation, since concern over the potential for cumulative impacts of short-term transfers was expressed.

Although the State Drought Water Bank represents an important option for the District in a critically dry year, there is a risk that the District will not be able to obtain all the water it needs from the bank. The highest priority of the bank is to provide water for "extreme critical needs," which include "domestic use, health, sanitation and fire protection." After extreme critical needs are met, water is allocated through a "leveling" process to meet the remaining needs of agricultural and M&I water users. M&I participants must be able to show that they are making maximum use of available water supplies, have total water supplies of less than normal demand, and have a voluntary or mandatory water rationing program in effect.

In addition to the risk that the District's purchases may be restricted by the critical needs of other banking participants, there is also the risk that the Bank may not be in existence during a year in which the District needs to buy water or may not be able to purchase sufficient supplies to meet all of the needs. The bank may not be operated if statewide hydrologic conditions are normal, and yet, if local conditions are dry or the District wants to rebuild groundwater storage, these may be years in which the District may still wish to supplement its imported water supplies.

2. State Water Project Short-Term Water Purchases

DWR and SWP contractors developed a 1-year agreement and purchased water for use in 1994. The 1-year water purchase agreement required less environmental documentation and serves as a pilot program for possible future longer-term purchases by the Water Purchase Committee to negotiate a 1-year Water Purchase Program. The District subsequently purchased 9,000 af under this program, and after conveyance losses received 7,380 af. The estimated cost of water that was actually delivered to the District was $67.5 per af at the SWP Bank's pumping plant, plus an additional conveyance cost at about $40 per af to the District's turnout.

3. Other District Short-Term Water Transfers

In 1989, the District purchased from Yuba County Water Agency 90,000 af of water, which was subsequently stored in San Luis Reservoir and used in 1989, 1990, and 1991 to alleviate the impacts of the recent drought. In 1991, the District purchased and transferred about 17,000 af of water from Placer County Water Agency. Due to carriage water losses through the Delta, the amounts of Yuba County and Placer County water delivered to the District were 69,000 af and 14,000 af respectively. All of the water was delivered to the County through the SWP facilities. The cost of Yuba County water was $45 per af, and for Placer County, $100 per af. After losses and conveyance costs are included, the total costs to the District were approximately $110 per af for the Yuba County water, and $180 per af for the Placer County water.

In addition, in 1993 the District entered into a 1-year option agreement with the Dudley Ridge Water District, another SWP contractor, for transfer of up to 30,000 af. Due to the availability of other supplies in 1993, the District did not use this option.

C. Current Opportunities

Because of the IWRP timeline for water transfers, the District has not placed a high priority on soliciting transfers from interested parties. However, the District does consider and evaluate transfer opportunities as they become available, such as the example described below.

1. CVP Joint Contract Assignment

In November 1996, Pajaro Valley Water Management Agency (Pajaro Valley) entered into an agreement with two property owners in Mercy Springs Water District (Mercy Springs) for the permanent contract assignment of 6,260 af of CVP agricultural water. There was a strong interest by Pajaro Valley to complete the assignment in order to have the water available for restoration of its groundwater basin in the future; however, local voters passed a referendum in June 1998 which placed a 10-year moratorium on building the pipeline needed for delivery of imported supplies to their service area. This moratorium has effectively delayed Pajaro Valley's prospects for delivery of water from the Mercy Springs contract assignment.

Pajaro Valley subsequently contacted other water agencies, including the District and Westlands

Water District (Westlands) regarding the possibility of entering into a joint contract assignment for CVP agricultural water from Mercy Springs. On December 15, 1998 the Board authorized the District's General Manager to execute a joint assignment contract with Westlands and Pajaro Valley for the Mercy Springs water supply. This transfer agreement was executed by all parties in May 1999.

The joint contract assignment shares costs among the three agencies and includes the following key terms and conditions:

- A minimum of 20,000 af will be delivered to the District over the 20-year term, with a maximum of 10,000 af during the first 10 years; within these limits, the District has first option on supplies allocated under the joint contract;

- Pajaro Valley has the option to buy out some or all of Westland's share after 10 years; if Pajaro Valley doesn't develop the capability to deliver this CVP supply within 20 years, the joint assignment continues with only the District and Westlands;

- The Bureau will recognize the District, Westlands, and Pajaro Valley collectively as the contracting party during long-term contract negotiations.

Chapter 11
Water Conservation

This chapter contains a detailed description of District water conservation programs. It also describes District studies and other activities that will help ensure IWRP conservation goals are realized.

A. Background

The District's Water Conservation Program has been developed in large part to comply with the BMP commitments, as defined in the 1991 Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). The program targets residential, commercial/industrial, and agricultural water use.

The District enjoys a special cooperative partnership with the water retailers in regional implementation of the BMPs. Several program elements have been developed in partnership with local retail water suppliers and the City of San Jose.

Water conservation was identified as an important component of the IWRP Preferred Strategy. The estimated savings from water conservation programs were presented in Chapter 4 (see Figure 4-7). Using 1997 as baseline (consistent with that used in the demand projection) the District expects to save 53,000 to 58,000 af per year from both passive and active water conservation.

B. Water Conservation Programs

This section describes the District conservation programs that are currently being implemented or are scheduled for implementation, including timelines, estimated conservation savings, and actual and projected budget and staffing for fiscal years 1999-2000 and 2000-2001. Programs are organized according to the BMP to which they correspond.

1. BMP 1: Residential Water Surveys

The District has developed and implemented a strategy to target and market water-use audits to single-family and multi-family residential customers. The BMP specifies that the District should have completed approximately 52,000 single-family surveys and surveyed approximately 29,000 multi-family units, representing 15 percent of all single-family and multi-family units by July 1, 2008. Not including partial credit for residential water surveys previously completed by the District's largest retailer, the San Jose Water Company (SJWC), approximately 5,200 single family surveys and 2,900 multi-family units are to be surveyed throughout the County per year to stay on track to meet the overall coverage requirement.

To attain this goal, District staff developed a pilot program in July of 1998 targeting the top 20 percent of residential customers within five of the District's ten participating water retailers (the cities of Milpitas, Morgan Hill, Mountain View, Santa Clara, and the San Jose Municipal Water System). Water savings per survey ranged from 43 to 78 gallons per day from a sample of audit participants. It is estimated that this program has the potential to reduce water demands by approximately 4,500 af/year.

With the exception of San Jose Water Company, the District now offers residential surveys for all of its retailers. SJWC performs surveys for customers who call regarding a high water bill, or while doing an Ultra-Low Flush Toilet inspection required under the toilet rebate program that ran from 1992-1999. SJWC began performing residential audits at the end of 1991 and is estimated to have completed well over 6,000 audits since the program began. During these audits, water meters are tested for accuracy, and an examination is performed throughout the household to identify any water leaks. In addition to the indoor residential surveys, SJWC developed a landscape audit program in 1994 which provides an extensive evaluation of the resident's landscape irrigation system. Through this program, residents are also trained on how to efficiently program their irrigation controllers.

The District has collected the following information regarding residential water surveys:

- **Number of single-family and multi-family residential accounts in service area.** Approximately 345,000 single-family and 193,000 multi-family residential units were in the District's service area in 1997, which was recently selected as the base year by the California Urban Water Conservation Council (CUWCC). Although Palo Alto and Los Altos Hills are within Santa Clara County, they are not included in this estimate since they obtain 100 percent of their water supply from non-District sources. These estimates were determined by using information obtained from the California Department of Finance, and comparing it to information obtained from the District's retailers.

- **Number of single-family residential surveys offered during reporting period.** This program was first offered by the District for its retailers, except SJWC, beginning in July 1998. SJWC has offered residential audits to its customers since the end of 1991.

  In fiscal year 1998-1999, the District, in cooperation with its retailers, offered surveys to 10,175 single-family accounts via letters mailed to the highest 20 percent of water users within the participating retailers. SJWC sent out bill inserts mentioning this program to all of its customers, which include approximately 187,000 single-family units.

  In fiscal year 1999-2000, the District expanded the program throughout its service area. The program was promoted through approximately 22,000 targeted letters to single-family accounts, bill inserts to 79,500 single-family accounts, and messages on water bills when available (approximately 39,300 in the Gilroy, Milpitas, and San Jose Municipal Water System).

- **Number of single-family residential surveys completed during reporting period.** In fiscal year 1998-1999, the District completed 377 single-family surveys for the retailers participating in the pilot program. SJWC completed 1,098 single-family surveys during this time.

  In fiscal year 1999-2000, the District completed 771 single-family surveys for all of its retailers except SJWC, which continued to offer surveys to their customers. SJWC completed 1,034 single-family surveys during this time.

- **Number of multi-family residential surveys offered during reporting period.** In fiscal year 1998-1999, letters were mailed to 833 multi-family accounts throughout the District's service area. San Jose Water Company offered surveys via a bill insert to all of their 101,000 multi-family units. The District also promoted this program though print ads and radio commercials.

  In fiscal year 1999-2000, letters were mailed to approximately 1,500 accounts. In addition, bill inserts promoting the residential survey program were mailed to approximately 1,500 multi-family accounts.

- **Number of multi-family residential units surveyed during reporting period.** In fiscal year 1998-1999, the District completed surveys in 495 multi-family units (62 accounts). At this time, the multi-family information for SJWC is only available by calendar year. In 1998, SJWC audited 424 multi-family units.

  In fiscal year 1999-2000, the District completed audits in 957 multi-family units. In 1999, SJWC audited 141 multi-family units.

- The District did monitor water use at a selected sample of 100 pilot program (1998) participants and found that water use declined between 43-78 gallons per day for single-family audit participants. The households that were offered audits during this pilot program were within the top 20 percent of water users for each of the participating retailers. Since 1998, this program has been offered to all residential customers, and it is expected that the water savings will decline as a result. The District plans to work with its retailers to track water use after audit completion and will continue to target the top 30 percent of water users within each retailer.

2. BMP 2: Residential Plumbing Retrofit

This BMP calls for high-quality, low-flow showerheads to be distributed to not less than 10 percent of single-family connections and multi-family units every 2 years until a 75-percent saturation of pre-1992 residences is obtained. The District makes low-flow showerheads and aerators available to residents free of charge through the water retailers, residential water audits, and public events. Since program inception in 1992, 110,559 low-flow showerheads and aerators have been distributed throughout the County.

The District believes it is likely that the County is at or near the 75-percent saturation threshold. This is based upon the fact that current efficiency standards require that only low-flow showerheads may be sold within the United States. The CUWCC report, Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices, estimates the average lifespan of a showerhead to be 3-7 years, and the average lifespan of an aerator to be 1-3 years. Given that 8 years have passed since the efficiency standard was enacted, the majority of showerheads in pre-1992 construction have likely been replaced already.

The District plans to conduct a study in fiscal year 2000-2001 to confirm the saturation rate for low-flow showerheads. Until this study is completed, the District will continue to provide free low-flow showerheads and aerators on demand.

A summary of the residential plumbing retrofit program appears in Figure 11-1 below.

Figure 11-1
Residential Plumbing Retrofit Summary

BMP number and name	2- Residential Plumbing Retrofit
Type of Program	Free distribution through retailers, water audits, and public events
Yearly Target Level	Showerheads: 50,556 Aerators: 98,373
1999 Actions – actual	Showerheads: 7,370 Aerators: 3,388
2000 Actions – planned	Showerheads: 10,000 Aerators: 5,000
2001 Actions – planned	Showerheads: 10,000 Aerators: 5,000

The District has collected the following information regarding residential plumbing retrofits:

- **The total number of non-retrofitted pre-1992 single-family residences and multi-family units**. This is currently beyond the scope of this BMP. The CUWCC MOU as amended September 16, 1999 requires the following for documenting BMP implementation: "The target population of pre-1992 single family residences and multi-family units to be provided showerheads and other water-saving devices." The correct number to report is thus the number of pre-1992 single family residences and multi-family units regardless of whether or not they were retrofitted. The number of pre-1992 homes (from the California Department of Finance) is reported in Figure 11-2**,** below.

Figure 11-2
District Low-Flow Showerhead Replacement BMP Target

Pre-1992 SF Homes	Pre-1992 SF Showerheads *	SF Annual Retrofit Target	Pre-1992 MF Homes	Pre-1992 MF Showerheads*	MF Annual Retrofit Target	Total Annual Retrofit Target
353,657	778,045	38,902	194,227	233,072	11,654	50,556

* Assumes 2.2 and 1.2 showerheads per household in single-family (SF) and multi-family (MF) homes, respectively.

- **The number of retrofit kits distributed and installed during previous reporting period.** Since program inception in 1992, 110,559 low-flow showerheads and aerators have been distributed throughout the County. In fiscal year 1998-1999, District staff distributed 14,688 showerheads. In fiscal year 1999-2000, District staff distributed 7,566 showerheads. It is difficult to determine whether or not all of the retrofit kits that were distributed were installed. In fiscal year 1998-1999, District staff installed 330 showerheads during water use audits. In fiscal year 1999-2000, District staff installed 570 showerheads during water use audits.

- **The estimated percentage of pre-1992 single-family residences and multi-family units in service area fitted with low flow showerheads and faucet aerators.** The District believes it is likely that the County is at or near the 75 percent saturation threshold (see above text for further discussion of this estimate).

3. BMP 3: Water System Audits, Leak Detection, and Repair

The District fulfills this BMP by having operated a distribution system audit and leak detection program since 1991. The District integrates its Leak Detection Program in the operation and maintenance of its wholesale treated water distribution and groundwater recharge systems. All facilities are 100 percent metered or gauged. The District's Leak Detection Program includes 24-hour-per-day monitoring of meters on all major conveyance facilities, daily flow records, monthly inspections, and water balances. Meters are calibrated regularly as part of the District's preventive maintenance program.

Flows in major facilities are monitored continuously with a SCADA system at the District's Operations Center, located at the Rinconada Water Treatment Plant and at each of the District's other two water treatment plants. Technicians and operators perform daily inspections and record metered and gauged flows daily to verify system integrity. Each month, right-of-ways with buried facilities are inspected by helicopter for signs of leakage.

An overall water balance and a treated water balance are conducted monthly to establish distribution and to identify possible meter problems or leakage. Typical error is within three percent. An error of greater than 5 percent will result in an investigation.

The District operates a facility for meter testing. Smaller meters up to 24 inches are tested based upon volume or time period. The program follows AWWA standards. Larger meters are periodically tested volumetrically where feasible. All meters are regularly calibrated to manufacturer specifications as part of the District's preventive maintenance program.
Within the District's distribution system, unaccounted for water is estimated to be less than 1 percent.

The District has collected the following information regarding water system audits, leak detection, and repair:

- **Prescreening audit results and supporting documentation**. Prescreening audit results from 1997 through July of 2000 are shown in Figure 11-3 below.

Figure 11-3
Metered Volumes Conveyed and Apparent Imbalance in Water Distribution Systems (af)

		1997	1998	1999	2000 through July
Supply (inflow)					
	Import (Revenue Meters)	151,851	118,289	170,108	80,392
	Local	22,152	32,280	12,565	5,011
Total		174,003	150,569	182,673	85,403
Distribution (outflow)					
	Treated (Revenue Meters)	132,350	122,032	130,938	58,965
	Released	39,612	26,681	50,071	25,762
	Untreated	2,259	1,533	2,023	982
Total Conveyed		174,221	150,246	183,032	85,709
Apparent Gain/(Loss)		218	(323)	359	306
Apparent Gain/(Loss) %		0.1%	(0.2%)	0.2%	1.0%

4. BMP 4: Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections

This BMP requires water meters for all new connections and billing by volume of use, as well as establishing a program for retrofitting any existing unmetered connections. The District implements this BMP in accordance with the MOU by metering and billing by volume of use all retail agency potable water supply deliveries.

There are no unmetered connections. As for retrofitting mixed meters, the District recently began a program that offers submeters to mixed-use accounts. Mixed-use accounts include both commercial sites where one meter serves both the irrigation surrounding the business building and the business itself, as well as accounts that serve both landscaping and apartment complexes. The District has provided eight submeters to eight mixed-use meters within a homeowners association. Staff will evaluate the effectiveness of submeters before developing the more expensive option of retrofitting mixed-use meters with irrigation meters.

The District operates an aggressive water measurement program for both treated water deliveries and groundwater pumpers. The current water measurement system measures 100 percent of all treated water use, 95 percent of surface-delivered raw water use, and 99 percent of all groundwater use. The remaining 1 percent (by volume) of groundwater use is by small water users such as residential well owners. Although these wells are not metered, an estimate of water usage is made and the well owner is billed. Metering small users such as these is not considered cost-effective at this time. The 5 percent of raw water use that is unmeasured constitutes approximately 115 af and is used by small landscape irrigators. Again, these customers' usage is estimated and the users are billed.

5. BMP 5: Large Landscape Conservation Programs and Incentives

This BMP calls for agencies to commence assigning reference evapotranspiration-based (ETo) water use budgets to accounts with dedicated irrigation meters and providing water-use audits to accounts with mixed-use meters by July 1, 1999. Through the Irrigation Technical Assistance Program (ITAP), since 1995 the District has offered and provided large landscape water audits to sites in the County with 1 acre or more of landscaping. A pre-screening mechanism was also incorporated which determines whether the site is over its ETo budget prior to conducting a full-scale audit. Landscape managers are provided with water-use analyses, scheduling information, in-depth irrigation evaluation, and recommendations for affordable irrigation upgrades. Each ITAP site and the appropriate retailer receive a detailed report upon completion of the audit. An annual report is generated to recap the previous year's efforts. To generate several reporting and monitoring options, water use history, meter numbers, account numbers, and site contacts and addresses are captured for each site in a specialized database.

ITAP reaches the community through advertising in Tri-County Apartment Association's monthly Apartment Management magazine and the San Jose Mercury News; colorful flyers at the biannual Home & Garden Show, the Northern California Turf & Landscape Council (NCTLC), and the Turf & Landscape Expo; retailer outreach through direct mailing of personalized letters to high-water-use customers; and through city newsletters and business newsletters.

This highly successful and well-received program has conducted over 385 audits to date. This program is achieving potential water savings of 1921 af/year. These audits will be credited towards the new BMP requirement. The District's staff is currently working on a comprehensive program to develop ETo-based water-use budgets for dedicated irrigation meters by using aerial images and GIS techniques.

The District has collected the following information regarding large landscape conservation programs and incentives for accounts with dedicated meters:

- **Number of dedicated irrigation meter accounts.** Based on both estimated and actual data provided by the District's water retailers there are more than 7,200 Dedicated Landscape Irrigation Accounts in the County. (Data from fiscal year 1999-2000.)

- **Number of dedicated irrigation meter accounts with water budgets.** The number of dedicated irrigation meter accounts with water budgets can not be determined precisely. This is due to lack of data from the District's water retailers. However, based on the ITAP data more than 1,500 sites have water budgets. (Data from fiscal year 1999-2000.)

- **Aggregate water use for dedicated landscape accounts with budgets.** The number of dedicated irrigation meter accounts with water budgets can not be determined precisely. This is due to lack of data from the District's water retailers.

- **Aggregate budgeted water use for dedicated landscape accounts with budgets.** The number of dedicated irrigation meter accounts with water budgets can not be determined precisely. This is due to lack of data from the District's water retailers.

The District has collected the following information regarding large landscape conservation programs and incentives for mixed-use accounts:

- **Number of mixed use accounts.** There are also more than 50,000 mixed used accounts in the County, which includes multi-family residential accounts.

- **Number, type, and dollar value of incentives, rebates, and no- or low-interest loans offered to, and received by, customers.** There are currently no District programs in place to offer incentives, rebates, or no/low interest loans to customers.

- **Number of audits offered.** ITAP audits are offered to over 1,000 customers each year.

- **Number of audits accepted.** Approximately 80-100 customers accept an ITAP audit.

- **Estimated water savings by customers receiving audits and implementing recommendations.** Estimated water savings vary between sites, but of the 358 sites addressed by the ITAP program so far, 257 did exhibit total saving potential saving of 1,921 af/year. During ITAP98 (1998-1999) effort was made to contact and revisit sites that had received ITAP services in the past. The overall average irrigation conservation achievement (based on 16 follow-up sites) was 17 percent for the group as a whole, an impressive amount of savings that will likely persist for some time.

6. BMP 6: High-Efficiency Washing Machine Rebate Programs

The District has offered a washer rebate in conjunction with Pacific Gas and Electric Company (PG&E) since July of 1995. The District has offered a $75 rebate since 1995, and has received reimbursement of $25 for each high-efficiency machine installed within the service area of the SJ/SC WPCP since 1998. Beginning July 1, 2000, the District increased its rebate to $100 since it began receiving an increased reimbursement of $50 per qualifying machine from the City of San Jose, which operates the SJ/SC WPCP.

The District has collected the following information regarding the high-efficiency washing machine rebate program:

- **Customer incentives to purchase high-efficiency washing machines being offered by local energy service providers, if any.** PG&E's rebate has decreased from a range of either $50 or $100, depending upon the efficiency of the machine, to a flat rebate of $75 for each qualifying machine.

- **Data to determine the amount of a high-efficiency washing machine incentive that would be cost-effective for the Contractor to provide its customers.** In 1999, District staff examined the cost-effectiveness of the residential high-efficiency washing machine rebate program. It was found that the District should offer a rebate of about $60 per machine based upon the lifetime of the measure (12 years, from the CUWCC's guidelines for preparing a cost-effective analysis), the cost savings estimate (5,100 gallons per year) and the avoided cost of new supply.

7. BMP 7: Public Information Programs

This BMP requires agencies to implement and maintain public information programs to promote water conservation and educate customers about water use. The District considers its public education and school programs to be essential components of the water conservation program.

The District operates an extensive public information program and associated schools program which provide materials, speakers and outreach activities to the general public. The District employs a professional staff of 10 to provide outreach related to water conservation, urban runoff pollution, water recycling, watershed and flood protection and water quality. In addition, Water Conservation Unit staff conduct targeted outreach tailored to individual conservation programs.

Outreach activities include publications and Web site development, public meetings, District participation at community events, multi-media campaigns, inter-agency partnerships, corporate environmental fairs, professional trade shows, water conservation workshops and seminars and a speakers bureau.

a. Water Wise Landscape Program

This program targets both single-family homeowners, commercial facilities, and the green industry professionals that serve them. This multi-element approach was designed to provide assistance at all points in the decision-making process: during the design, purchase of material, and upkeep and maintenance on existing landscape.

Nursery Program

To increase the public's awareness of water-efficient gardening techniques, in 1995 the District developed the Nursery Program, which consists of a series of educational materials and store displays that have been distributed and maintained in nurseries throughout the County.

The program includes literature racks offering free informational sheets about water-wise gardening. The nursery program literature is currently being revised and will continue to be displayed.

Water-Efficient Landscape Workshop Series

Each spring, the District hosts its Water-Efficient Landscape Workshop Series for County residents. The series consists of three consecutive class sessions addressing topics such as garden design, plant selection, irrigation design and installation, and maintenance techniques. The series draws approximately 100 attendees each year.

Spanish-Language Irrigation Workshop Series

These biannual workshops provide hands-on training to Spanish-speaking landscape professionals on irrigation controller programming, system scheduling, and irrigation trouble-shooting. This seminar is supported by irrigation manufacturers who donate equipment and materials for the hands-on portion of the class. Each class of 30 landscape professionals typically maintain over 400 sites in the County.

Landscape Water Management Seminar

Designed for landscape irrigation professionals, this seminar provides training in irrigation system evaluations, water budgeting and water-use tracking. Made possible through a partnership with the Irrigation Training and Research Center of CalPoly, these ongoing training sessions are offered two to three times a year.

Water-Efficient Landscape Awards Program (Upcoming)

This awards program is designed to recognize home gardeners, landscape professionals, and public agencies who have installed healthy and beautiful water-efficient landscapes. The awards program conveys the message that attractive landscapes can be created without sacrificing water efficiency and also provides the opportunity to thank homeowners and professionals for their conservation efforts. The program aims to educate and encourage residents to grow water-efficient gardens.

b. *Industry-Specific Workshops*

In May and June 1995, the District, in conjunction with the City of San Jose, hosted three Cooling Tower Workshops developed by Black & Veatch and sponsored by the Metropolitan Water District of Southern California. The workshops outlined the fundamentals of cooling tower operation and water conservation technologies. The workshop drew participants from over 35 businesses/corporations in the County.

c. *Leak Detection Workshop*

In November 2000 and June 1996, the District hosted a Water Audit and Leak Detection Seminar developed by the state Department of Water Resources. Targeted at water agencies and retailers in Northern California, this two-day seminar taught participants how to perform a water audit of their distribution systems and techniques in which they could detect leakage.

d. *Peninsula Conservation Center's Business Environmental Awards Program*

Last year, the eighth annual awards program recognized small and large businesses in the county that implemented environmental programs within their businesses. The District cosponsors this award each year by providing support for the production of brochures and application materials. District staff also serves on the selection committee for the water category.

The District has collected the following information regarding public information efforts:

- **Number of public speaking events relating to conservation during reporting period.** Approximately 24-30 public speaking events mention water conservation annually, and outreach extends to Spanish and Vietnamese audiences where possible. See the above text for examples of specific programs.

- **Number of media events relating to conservation during reporting period.** There were many media releases, press conferences, and media inquiries (which may result in articles or television spots) dealing with water conservation in the past several years.

  The "Hey Mrs. Noah" program was developed in July of 1999 to promote water efficiency, and specifically the end of the District's toilet rebate program, along with the residential clothes washer and residential audit program. This media campaign began in July of 1999 and ran through September 1999. Outreach included advertisements on the radio, on buses, in newspapers, and through bill inserts. Numbers for each media used are detailed below.

  Radio: Six stations (including Spanish) ran ads for a total of 13 weeks. The District does not have a count of the spots, because media buyers do not use such counts to analyze radio. Staff estimates between 400 and 600 radio spots total for the duration of the campaign.

  Transit: The District used transit bus back signs to advertise our message throughout most of our service area. The total number was 10 large, or fullback, signs, and 85 smaller, or taillight, signs.

  Newspaper: The District ran nine weeks of ads in the Mercury News in four sections of the paper, totaling between 30 and 40 ads. Additional ads in community papers totaled about 30, including Spanish- and Vietnamese-language papers.

  Bill inserts: Bill inserts were utilized by our retailers, but the exact numbers are not available.

  In July 2000, the District began promoting the residential audit and residential clothes washer program. This program was promoted on Spanish and English television and radio, bill inserts, and newspaper ads (English and Vietnamese).

- **Number of paid or public service announcements relating to conservation produced or sponsored during reporting period**. See "Number of media events relating to conservation" section, above.

- **Budget for public information programs directly related to conservation.** The budget for public outreach programs related to water conservation is approximately $200,000 per year.

8. BMP 8: School Education Programs

This BMP requires water suppliers to implement a school education program that includes providing educational materials and instructional assistance. In 1994 the District's Public Information Office hired a full-time, fully credentialed educator who holds life-time teaching and Administrative Services credentials to coordinate the school education programs. This included developing school programs, contracting with the Youth Science Institute for additional instructors, and supervising university student interns as classroom assistants.

The District has been continuously active in this area by providing free classroom presentations, puppet plays, and tours of District facilities to schools within the County. The objective is to teach students about water conservation, water supply, watershed stewardship and flood protection. The District also provides school curricula to area educators, including workbooks and videos, as well as hands-on training for teachers. The goal of the program this year is to reach 15,000 students, ranging from pre-Kindergarten through college.

The District has collected the following information regarding the schools program:

- **Number of school presentations made during reporting period.** 602 class presentations were given.

- **Number and type of curriculum materials developed and/or provided by water supplier, including confirmation that curriculum materials meet state education framework requirements and are grade-level appropriate**. Materials distributed to students included Water Colors to students in grades Kindergarten and first, Water Junction & Journal to students in grades two and three, Rain to Drain to students in grades four through six, and project Water Science to students in grades seven through twelve. All meet state education framework requirements and are grade-level appropriate. We do not have a breakdown of how many of each book were distributed, but all 15,000 students who participated in the program received materials.

- **Number of students reached.** Approximately 15,000 students were reached.

- **Number of in-service presentations or teacher's workshops conducted during reporting period.** Ten teacher in-service workshops were held during the 1999-2000 school year.

- **Budget for school education programs related to conservation.** The education budget for the 1999-2000 school year was $271,685.

9. BMP 9: Conservation Programs for Commercial, Industrial, and Institutional Accounts

a. *CII Audits*

During fiscal year 1996-1997, the District implemented a regional pilot program that provided 24 water-use audits for large water-using businesses and industries in the County. The audits provide thorough water-use analysis and recommendations for efficient process upgrades. According to the District's consultant, ERI, the acceptance rate for CII audits was above 80 percent.

SJWC has been offering commercial water-use audits since 1994. Since 1994, they have completed 327 audits.

b. *Financial Incentives Program (FIP)*

To encourage all commercial and industrial businesses to implement permanent water reduction measures, the City of San Jose offers financial awards to businesses in San Jose, offering $4 for every hundred cubic feet (HCF) of water conserved. Rebates range from $400 to $50,000 per site. Since 1997, the District and the City of San Jose have entered a cost-sharing agreement to jointly fund this program. Additionally, the District plans to expand this program countywide in fiscal year 2000-01. To date, the District has reimbursed the City of San Jose $210,348 for 28 projects saving approximately 313,897 CCFs per year.

c. *Commercial Toilet Program*

5,000 toilets were replaced in CII sites during the District's toilet rebate program, which ran from 1992 to October 31, 1999. Additionally, the District reimbursed the City of San Jose for toilets replaced through their institutional programs (City facilities and schools: 1,102 toilets) and CII voucher program (1,846 toilets) between January 1, 1998 and June 30, 2000. The District is currently developing a program to target replacement of toilets in restaurants, gas stations, and wholesale/retail establishments, where there are greater water savings opportunities.

d. *Commercial Washer Program*

In July 1999, the District, Silicon Valley Power (which supplies electricity to customers within the City of Santa Clara), and the City of San Jose began offering $350 rebates for the replacement of high-efficiency clothes washers in laundromats. Eleven clothes washers were replaced between July 1999 and July 2000.

Beginning in July 2000, the commercial washer program was expanded throughout the county. Cost-sharing partners now include PG&E, Silicon Valley Power, and San Jose. The program also now includes commercial machines installed in multi-family complexes. Customers are eligible to receive up to $350 per qualifying machine.

The District has collected the following information regarding conservation programs for CII accounts:

- **The number of customers and amount of water use within the CII customer classes.** Although the District collects and analyzes water use patterns using retailer use by class data, each of the retailers in the County use different classification breakdowns making compilation or analysis difficult. Most of the District's retailers do not have a separate classification for Institutional, Industrial, and Commercial Customers. Often, commercial accounts are grouped with large multi-family accounts. Only two of the District's nine retailers identify their CII customers by SIC codes.

  Consequently, detailed breakdowns of water use within the District by CII classes are not available. The District is looking into other ways to obtain SIC codes and has obtained lists of hotels, restaurants, gas stations, and other commercial sites by contacting County agencies that regulate these facilities. The District hopes to work with its water retailers through the Water Conservation Monitoring and Evaluation Program to develop reporting methods that are clear and uniform for all retailers by the next Plan update.

- **Number of CII customers offered an audit.** During fiscal year 1996-1997, the District implemented a regional pilot program that provided 24 water-use audits for large water-using businesses and industries in the County. SJWC has been offering commercial water-use audits since 1994.

- **Number of CII audits completed.** According to the District’s consultant, ERI, the acceptance rate for the District's CII audits was above 80 percent. Since 1994, SJWC has completed 327 audits.

- **Number of follow-up audits completed this year.** Follow-up audits are not currently part of the program; however, this component will be included in the future.

- **The type and number of water-saving recommendations implemented.** The Submeter Retrofit Pilot (fiscal year 1999-2000) has estimated annual water savings of 6,300.15 HCF represented by the installation of 433 residential submeters.

  Through a cost-sharing arrangement with the City of San Jose's industrial conservation program, (formerly FIP) the District has contributed to the 330,115 HCF annual savings from this program. The industrial program implements a variety of industrial process retrofits.

The Commercial Washer Rebate Pilot (fiscal year 1999-2000) has provided 407.94 HCF in annual savings. The extension of this pilot as a countywide program is expected to produce 500 rebates, or approximately 18,542.78 HCF in annual savings.

- **Incentive program budget and customer outlays.** For the Submeter Retrofit Pilot (fiscal year 1999-2000) the District funded one-third ($28) of the cost of each submeter and its installation, the customer funded one-third, and the City of San Jose funded one-third. The Pilot budget was $21,000, representing two-thirds of the submeter cost and installation. The District was reimbursed by the City of San Jose for half of that sum. The customer's cost was approximately $12,124.

  For the industrial retrofit programs, customers are reimbursed $4 per each CCF proved in savings. During fiscal year 1998-1999 the District's portion of the funding for this program was $150,000. During fiscal year 1999-2000 the District contributed $60,348. Customer costs vary per project. During fiscal year 1998-1999 the average total project cost was $145,150. The 1999-2000 projects are pending. An accurate count for this fiscal year will be available at the end of 2000.

  For the Commercial Washer Rebate Pilot, customers pay on average $1,200 per machine. Through an ADA tax credit available for most qualifying washers customers receive a cost reduction of $563. The District provided a $350 rebate per machine; $100 of that was provided by the City of Santa Clara, and $125 of that was contributed by the City of San Jose.

10. BMP 10: Wholesale Agency Assistance Programs

This BMP defines a wholesaler’s support role in terms of financial, technical, and programmatic assistance to its retail agencies implementing BMPs. District and water retailer staff have begun discussions on the wholesaler and retailer relationship, especially in light of a possible certification and enforcement process coming from CALFED.

The District has collected the following information regarding wholesale agency assistance programs:

- **The total monetary amount of financial incentives and equivalent resources provided to retail members to assist, or to otherwise support, the implementation BMPs, subtotaled by BMP.** The District does not provide monetary incentives to the retailers. Rather, it provides the resources of its Water Conservation Unit to run all of the MOU BMPs. See each individual BMP section in this report for a description of District efforts.

- **The total amount of verified water savings achieved by each wholesaler-assisted BMP.** See each individual BMP section in this report for the water savings related to that BMP.

11. BMP 11: Conservation Pricing

The District fulfills this BMP by metering and billing by volume of use for all water deliveries to its retail agencies. The District has limited authority to set or enforce consumption limits at the retail level; however, the District has worked with water and wastewater agencies to discourage non-conservation pricing and to promote conservation pricing, which provides incentive for customers to decrease their water usage. Conservation pricing methods include uniform water rates and increasing block rates, which increase along with the quantity of water used.

District support has also included testimony before the PUC and funding for the CUWCC rate guidebook project. The water retailers utilize water rate structures that conform to conservation pricing definitions as outlined in the MOU.

The District has collected the following information regarding conservation pricing:

- **Revenue generated by customer class for the reporting period.** Detailed financial data for the District is available in the Water Utility Enterprise Report.

- **Revenue derived from commodity charges by customer class for the reporting period.** As a wholesaler, the District details its collected revenue by Agriculture (AG) and Non-Agriculture for three type of water; treated, ground, and surface. Revenues for each appear in Figure 11-4.

Figure 11-4
Water Use and Revenue by Zone, Ag & Non-Ag, FY 1998-1999

TREATED WATER			
	NON-AG AF	AG AF	REVENUE
ZONE W-2	129,405.65	0.00	$ 41,182,621.00
GROUNDWATER			
	NON-AG AF	AG AF	REVENUE
ZONE W-2	104,312.80	1,181.66	$ 27,152,051.16
ZONE W-5	27,734.49	22,199.35	$ 2,697,062.29
SURFACE WATER			
	NON-AG AF	AG AF	REVENUE
ZONE W-2	1,202.64	162.05	$ 344,909.10
ZONE W-5	27,734.49	22,199.35	$ 49,099.95

12. BMP 12: Water Conservation Coordinator

The District has had a full-time water conservation coordinator since 1990. The District also has four full-time water conservation specialist positions, one of which is currently vacant. Additional contract staff, ranging from four to nine persons depending on season and program need, are hired as needed.

Name: Hossein Ashktorab
Title: Water Conservation & Recycling Unit Manager
Telephone: (408) 265-2607, ext. 2291

Name: William Granger
Title: Water Conservation Specialist II
Telephone: (408) 265-2607, ext. 2090

Name: Karen Morvay
Title: Water Conservation Specialist I
Telephone: (408) 265-2607, ext. 2707
Name: Gerry De La Piedra
Title: Water Conservation Specialist I
Telephone: (408) 265-2607, ext. 2257

13. BMP 13: Water Waste Prohibitions

As a wholesale water supplier, the District fulfills this BMP by having developed a set of water-use restrictions in 1989 and 1993 to assist the water retailers in the development of their own water waste prohibitions. The District first implemented potable water use restrictions in

1989. Such restrictions, along with public outreach and education efforts, helped the County reach a water use reduction of over 25 percent in 1991. Water savings continued despite the end of the drought.

In addition, the District Act (Section 26.7) allows the District to develop overproduction charges for groundwater pumping. This provision allows the District the flexibility to provide any necessary incentive required to achieve cooperation on the part of local retail water suppliers, and is quoted below:

> § 26.7. Levy and collection of groundwater charges; rates; new or adjusted charges, reports; notice; hearing; errors
> (C) The rate or rates, as applied to operators who produce groundwater above a specified annual amount, may, except in the case of any person extracting groundwater in compliance with a government-ordered program of cleanup of hazardous waste contamination, be subject to prescribed, fixed, and uniform increases in proportion to increases by that operator in groundwater production over the production of that operator for a prior base period to be specified by the board, upon a finding by the board that conditions of drought and water shortage require the increases. The increases shall be related directly to the reduction in the affected zone groundwater levels in the same base period.

14. BMP 14: Residential Ultra-Low-Flush Toilet Replacement Programs

This BMP calls for the implementation of programs for replacing existing high-water-using toilets with ULFTs in single-family and multi-family residences. The program must result in water savings equivalent to having an ordinance requiring toilet replacement at time of home resale. Since August 1992, the Water Conservation Program, in conjunction with each of the ten participating retailers and through a series of cost-sharing agreements with the City of San Jose, has provided incentives for the retrofit of 195,288 residential toilets. These retrofits are estimated to have achieved a demand reduction of 5,524 af/year. The District has met approximately 86 percent of the BMP cumulative water savings target to date. The deficit is attributable to the District's inability to meet annual targets in the first 3 years of the program.

The District has exceeded its annual targets in each of the past 4 years, closing the gap on the cumulative target from 37 percent compliance to 86 percent compliance. Figure 11-5 describes the ULFT replacement program targets. Figure 11-6 provides the data used by the District to calculate these targets. And figure 11-7 details the District's progress in implementing BMP #14.

From 1992 through 1999, the District offered rebates to residential customers who replaced their old toilets with ULFTs. The original rebate level was $75. However, due to declining program participation, the District ran 3-month special offers in 1998 and 1999 during which time the rebate was increased to $100. These special offers were accompanied by major marketing campaigns in which the program was promoted through television, radio, newspaper, bill inserts, bus boards, direct mailings, and public events.

The District ended its rebate program in 1999 and is shifting the focus of its Residential ULFT Program towards program elements that are more targeted than a mass-rebate program. The District plans to launch two new program elements in 2000: full-service installations targeted to large multi-family property owners and ULFT distribution events targeted to single-family residents. The estimated net cost (after cost-sharing) to the District for these programs will be $106 per ULFT.

The District and the City of San Jose recently entered into a fourth annual cost-sharing agreement that calls for the City to install 19,333 ULFTs in the SJ/SC WPCP's service area. The City is currently planning to reach this installation target through two primary program elements: a full service program for small multi-family complexes, providing ULFTs, installation, and old toilet recycling for a $25/ULFT co-payment, and a free direct installation program targeted to low-income, elderly, and disabled single-family residents. The District will reimburse the City $75 for each ULFT installed through these programs.

Figure 11-5
ULFT Replacement Program Targets

BMP number and name	14 – ULFT Replacement Programs
Type of Program	Multiple, targeted program elements
Yearly Target Level	1999: 412 af/yr; 2000: 335 af/yr
1999 Actions - actual	696 af/yr (25,983 ULFTs)
2000 Actions - planned	971 af/yr (31,333 ULFTs)
2001 Actions - planned	551 af/yr (18,000 ULFTs)
Area of Program	Santa Clara County

Figure 11-6
Calculation of BMP #14 Savings Requirement

Step One: Determine Local Adjustment Factors

Exhibit 6 requires the following information in order to estimate local per household water savings from ULFT installations:

1) Average number of people per household (SF and MF)
2) Average number of toilets per household (SF and MF)
3) Mix of pre-1980 and post-1980 toilets (SF and MF)

Data for the Santa Clara Valley Water District is listed below:

Total SF housing units as of 1992: 353,657 (source: CA Dept. of Finance)

Pre-1980 SF housing units: 293,412[1]
Post-1980 SF housing units: 60,245[1]
Total MF housing units as of 1992: 194,227 (Source: CA Dept. of Finance)
Pre-1980 MF housing units: 161,140[1]
Post-1980 MF housing units: 33,087[1]
SF people per household: 3.3[2]
MF people per household: 2.4[3]

SF toilets per household: 2.2 (source: Santa Clara County Center for Urban Analysis)
MF toilets per household: 1.3 (source: Santa Clara County Center for Urban Analysis)
Non-adjusted SF ULFT savings per household: 43.8 gpd (CUWCC exhibit 6, table 1)
Non-adjusted MF ULFT savings per household: 48.5 gpd (CUWCC exhibit 6, table 2)

SF adjustment for pre/post 1980 mix: gpd/household = [(279,913 * 43.8 * 1.015) + (57,475 * 43.8 * 0.812)] / 337,388 = 42.9
MF adjustment for pre/post 1980 mix: gpd/household = [(153,623 * 48.5 * 1.0255) + (31,542 * 48.5 * 0.8205)] / 185,165 = 48.0

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[1] Source: ABAG Projections 90; This source provided data on total households in the region in 1980. Individual tallies of SF and MF households in 1980 were not available, so estimates were derived by assuming the ratio of SF to MF households was the same in 1992 as it was in 1980.

[2] Source: CA Dept. of Finance data details SF residential density of 3.112 in 1990. From 1990 to 1998, residential density for all households (SF and MF combined) increased from 2.813 to 2.998. This analysis assumes an equal proportional increase in densities between SF and MF housing between 1990 and 1998. This assumption does not significantly affect final savings estimates for SF housing, as the CUWCC planning tables do not provide for changes in savings levels for residential densities above 3.0.

[3] Source: CA Dept. of Finance data details MF residential density of 2.233 in 1990. See previous note for trend in residential densities from 1990 to 1998.

[4] Reliability adjustments: SF savings = 41.5 gpd/household; MF savings = 46.5 gpd/household

Figure 11-6 Continued
Calculation of BMP #14 Savings Requirement

Step Two: Estimate Water Savings from a Hypothetical Retrofit Upon Resale Ordinance

Once per-household toilet savings have been established, an agency's savings target can be determined by estimating the impact of a hypothetical retrofit upon resale ordinance. This impact can be measured by determining housing turnover rates and the natural toilet replacement rate. The data used in the analysis is listed below:

Single-family housing turnover rate:	4.0 percent (Sources: San Jose Real Estate Board and Santa Clara County Center for Urban Analysis)
Multi-family housing turnover rate:	7.0 percent (Sources: San Jose Real Estate Board and Santa Clara County Center for Urban Analysis)
Natural toilet replacement rate:	4.0 percent (Source: CUWCCC, Exhibit 6)

Based on this data, spreadsheets were set up to project ULFT installations over time under two scenarios: 1) natural replacement only; and 2) natural replacement combined with retrofit upon resale. The difference in savings between Scenario 2 and Scenario 1 is the net effect of the hypothetical ordinance.

Figure 11-7
Implementation Status for BMP #14

Year	SFD ULFTs	SFD af/yr Saved	MFD ULFTs	MFD af/yr Saved	Annual Savings (af/yr)	BMP Annual Target (af/yr)	% of Annual Target Met	Cumulative Savings (af/yr)	BMP Cumulative Target (af/yr)	% of Cumulative Target Met
92/93	2,073	44	7,936	318	362	1,285	28%	362	1,285	28%
93/94	5,802	123	3,669	147	270	1,114	24%	631	2,399	26%
94/95	12,279	259	3,920	157	417	961	43%	1,048	3,359	31%
95/96	15,730	332	4,478	179	512	824	62%	1,560	4,183	37%
96/97	24,307	514	17,134	687	1,200	702	171%	2,760	4,885	56%
97/98	14,430	305	8,968	359	664	594	112%	3,424	5,479	62%
98/99	28,817	609	19,840	795	1,404	497	282%	4,828	5,977	81%
99/00	18,036	381	7,871	315	696	412	169%	5,524	6,389	86%
Totals	**121,474**	**2,567**	**73,816**	**2,957**						

C. Budget and Staff Time

Figures 11-8 and 11-9 summarize the water conservation activities discussed above and associated implementation time frames, budget, and staffing.

Figure 11-8
Actual Current Year Water Conservation Budget and Staff Summary

YEAR 99-00

BMP # BMP Name	**Est. Budget**	**Est. Staff time**
1 Residential Water Audits	$300,000	0.6 FTE[1]
2 Residential Retrofit	$21,000	0.1 FTE
3 System Water Audit & Leak Detection	(Operations budget)	(Operations staff)
4 Metering w/ Commodity Rate	($0-Fully metered)	N/A
5 Landscape Water Audits	$200,000	0.4 FTE
6 Washing Machine Rebates	$450,000	0.3 FTE
7 Public Information	$200,000	~1 FTE
8 School Education Program	(PIO budget ~$200,000)	(PIO -1 FTE)
9 CII Conservation Programs	$275,000	1 FTE
10 Wholesale Agency Programs	(Entire program)	N/A
11 Conservation Pricing	N/A	N/A
12 Conservation Coordinator	~$100,000	1 FTE
13 Water Waste Prohibition	N/A	N/A
14 ULFT Program	$3,037,000	0.8 FTE
	TOTAL ~$4,783,000	**~6 FTE**

[1] The District relies upon 4-8 temporary staff that are hired as auditors. The staffing level peaks between July and September, but approximately 2-4 interns continue to work for the District during the school year.

Figure 11-9
Projected Water Conservation Budget and Staff Summary

YEAR 00-01

BMP #	**BMP Name**	**Est. Budget**	**Est. Staff time**
1	Residential Water Audits	$300,000	0.6 FTE[1]
2	Residential Retrofit	$21,000	0.1 FTE
3	System Water Audit & Leak Detection	(Operations budget)	(Operations staff)
4	Metering w/ Commodity Rate	($0-Fully metered)	N/A
5	Landscape Water Audits	$200,000	0.4 FTE
6	Washing Machine Rebates	$350,000	0.3 FTE
7	Public Information	$100,000	~1 FTE
8	School Education Program	(PIO budget ~$200,000)	PIO -1 FTE)
9	CII Conservation Programs	$275,000	1 FTE
10	Wholesale Agency Programs	(Entire program)	N/A
11	Conservation Pricing	N/A	N/A
12	Conservation Coordinator	~$100,000	1 FTE
13	Water Waste Prohibition	N/A	N/A
14	ULFT Program	$3,037,000	0.8 FTE
		TOTAL ~$4,583,000	**~6 FTE**

[1] The District relies upon four to eight temporary staff that are hired as auditors. The staffing level peaks between July and September, but approximately two to four interns continue to work for the District during the school year.

D. Water Conservation Studies and Other Activities

1. Water Conservation Baseline Study

The District and its retailers have implemented a number of water conservation programs and watched as customers' water use decreased during the drought of 1987-1993. While the District can easily measure the overall reduction in water use, there are a number of things that it cannot readily determine. For example, how much of that water reduction was a permanent change in response to ongoing conservation programs versus a more temporary response to the drought crisis? How much of the savings can be attributed to the Landscape Audit program versus the ULFT rebate program? Was it technical assistance, financial incentives, or simply education that caused customers to change their water use behavior? The answers to these and other, similar questions are crucial to the development of reliable, accountable, and cost-effective conservation programs.

To determine how and why conservation programs work and which customer groups are conserving, the District will conduct a Baseline Study. The study is designed to give the District a better understanding of its customers' attitudes and practices regarding water conservation.

Study results will help the District establish a baseline from which future water savings are measured and determine the penetration of water-using hardware and appliances within the District's water service area.

A sample group of 300 to 500 customers will be studied over a 4-month period. The results of the Baseline Study will provide the foundation for the Monitoring and Evaluation (M&E) Program described later in this chapter.

Study objectives are to:

- Establish a baseline from which future water savings are measured.
- Update the District's demand reduction potential.
- Clarify customers' current attitudes and practices regarding water conservation.
- Identify the type and market penetration of water-using appliances and fixtures currently installed within the County.
- Develop water use profiles for each of the major municipal and industrial customer categories: Single-family residential, Multi-family residential, Commercial, Industrial, and Institutional.
- Determine customers' attitudes and opinions regarding the District's anticipated future conservation programs.

2. Water Conservation Master Plan

Once the Baseline study is complete, the District will not only have a better understanding of its customers' attitudes and beliefs regarding water conservation, it will know the distribution of hardware, appliances, and landscape and irrigation system characteristics within its service area. Armed with this information, the District can then design or modify its water conservation program to meet stated goals.

Preparation of a Water Conservation Master Plan is the next logical step in the District's effort to design and implement an effective, accountable, and long-term water conservation program. The Water Conservation Master Plan will provide the framework within which the future conservation program will operate. It will present the big-picture view of the District's conservation efforts and provide an implementation strategy for all elements of the future conservation program.

The objectives of the Water Conservation Master Plan are as follows:

- Clarify the District's and its water retailers' roles regarding conservation efforts in the County.

- Present the District's future water conservation plans including program descriptions, costs, and savings estimates.

- Develop an implementation strategy for the District's future water conservation efforts, including a program budget, staffing plan, and implementation schedule.

- Further define the parameters of the M&E program, including more refined staffing and cost estimates.

The Water Conservation Master Plan will also provide a forum for discussion and debate of conservation policy issues as the District re-examines its role regarding water conservation in the County.

The District currently enjoys a special cooperative partnership with the water retailers in regional implementation of the BMPs. It is imperative that the District continue to work closely with the water retailers to more clearly define each entity's roles and responsibilities. The District will also conduct special meetings with the City and County of San Francisco Public Utility Commission (SFPUC) to resolve specific issues pertaining to those retailers who receive water from both the District and the SFPUC. Issues with policy and cost implications should be explored within the Master Plan.

3. Monitoring and Evaluation Program

The focus of the current water conservation monitoring effort has been the tracking of activity levels and program costs. In order to ensure future savings goals are achieved and water conservation programs are successful, the District is enhancing its existing monitoring program to more rigorously quantify actual water savings. An improved and formalized Monitoring and Evaluation (M&E) Program would increase the overall reliability of the water conservation program. In addition, the recently revised water conservation MOU includes minimum record keeping and reporting requirements for agencies to document BMP implementation levels. These guidelines will be incorporated into the revised M&E Program.

The M&E Program will build on the District's existing conservation monitoring program to more rigorously quantify actual water savings. It will include development of an evaluation strategy for each of the District's existing and planned conservation measures, and a database to track water conservation activities and calculate water savings.

4. CALFED Water Use Efficiency Program

The August 2000 CALFED Record of Decision defined an important and ambitious program for urban water conservation and recycling, collectively referred to as the Water Use Efficiency

(WUE) Program. This goal of this Program is to promote and encourage enhanced water use efficiency throughout the state, providing grants and loans to participating water agencies to finance efficiency programs beyond the level that would otherwise be locally cost-effective.

Elements necessary for the implementation of this Program include the development of a Program implementation plan; the development of the CALFED funding and technical assistance program, criteria, and schedule; and development of an urban Best Management Practices certification program. The District is looking to participate, possibly through California Urban Water Agencies, in the development and negotiations of this certification program and in its implementation. The District will also pursue CALFED funding and technical assistance.

5. The Governor's Water Shortage Reduction Marketing Program

As part of the August 2000 CALFED Record of Decision, the Governor convened an Advisory Drought Planning Panel (Panel) to develop a contingency plan for reducing impacts of critical water shortages in the next several years. The Panel is scheduled to forward its recommended Water Shortage Reduction Marketing Program (WSRMP) to the Governor by December 31, 2000. The WSRMP recommends the establishment of a "water bank" for water users to access in elevated shortage conditions. The WSRMP also recommends the state provide financial and technical assistance to local agencies to plan for shortages so that the water bank will be reserved for the more critical, widespread shortage conditions.

The District's Board Chair participated on the Governor's Panel in developing this WSRMP. The District will continue to participate in the further development and implementation of the program.

Sources

Santa Clara County General Plan
ABAG, Projections 98
SCVWD, Groundwater Management Programs, March 1999.
SCVWD, Water Utility Enterprise Report (Preliminary), April 1999.
SCVWD, Statistical Analysis of IWRP Preferred Strategy, November 1998.
SCVWD, Integrated Water Resources Plan Final Report, January 1997
SCVWD, Water Supply Overview Study (Draft), November 1994.
SCVWD, 1995 Urban Water Management Plan, March 1996.
SCVWD, Operational Storage of Santa Clara Valley Groundwater Basin, March 1999.
SCVWD, Groundwater Elevation Monitoring Network – Santa Clara Valley Groundwater Basin, December 1998.
SCVWD, Santa Clara County Water Supply and Use.
SCVWD, Draft Water Demand Update Report, 2000.
SCVWD, Integrated Water Resources Plan Implementation Plan, June 1999.
SCVWD, Draft Drought Management Plan, 2000.
SCVWD, Water Utility Business Plan, November 1998.

Appendix A
Urban Water Management Planning Act

The Urban Water Management Planning Act became effective on January 1, 1984. The Act, originally AB 797, had a termination date of January 1, 1991. Subsequent legislation, AB 2661, effective July 19, 1990, deleted this termination date and imposed a state-mandated local program indefinitely. This and subsequent amendments to the Act are described in the table below.

Table A-1
Amendments to the Urban Water Management Planning Act

Amendment	Year	Action
AB 2661	1990	Deleted the original Act's sunset date, continuing the state-mandated program indefinitely.
AB 11X	1991	Required the addition of the Urban Water Shortage Contingency Plan.
AB 1869	1991	Increased the reclamation elements to be included in the Plan.
AB 892	1993	Established that the annual reports required of California Urban Water Conservation Council (CUWCC) members can be submitted to meet the description of conservation measures required in the Plan. Required that methods for involving community members in the decision-making process be identified in the Plan.
SB 1017	1994	Allowed urban water suppliers to recover in their rates the cost of preparing the Plan and implementing the water conservation measures included in the Plan.
AB 2853	1994	Changed the word "reclaimed" to "recycled" throughout the Plan. Required Plan preparation to be coordinated with local water agencies, planning agencies, and wastewater agencies. Required that information on recycled water and its potential use be identified in the Plan.
AB 1845	1995	Required a resource assessment of the reliability of the urban water supplier's water service to its various categories of customers during normal, dry, and critically dry water runoff years.
SB 1011	1995	Required the plan be updated every 5 years and submitted to DWR before December of the years ending in 5 and 0. Required DWR to report to the legislature in the years ending in 1 or 6, summarizing the status of the reports submitted. Required that each urban water supplier "shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the Plan."

Urban Water Management Planning Act

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. The Legislature finds and declares as follows:

(a) The waters of the state are a limited and renewable resource subject to ever increasing demands.
(b) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
(c) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.
(d) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.
(e) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet the needs of both existing customers and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

CHAPTER 2. DEFINITIONS

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 7 (commencing with Section 4010) of Part 1 of Division 5 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS

Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier after December 31, 1984, shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.
(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.
(b) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640). Article 2. Contents of Plans

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments as described in subdivision (a).

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e)(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments as described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being

implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Interior and exterior water audits and incentive programs for single-family residential, multifamily residential, governmental, and institutional customers.

(B) Enforcement of plumbing fixture efficiency standards and programs to retrofit less efficient fixtures.

(C) Distribution system water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape water audits and incentives.

(F) Landscape water conservation requirements for new and existing commercial, industrial, institutional, governmental, and multifamily developments.

(G) Public information.

(H) School education.

(I) Commercial and industrial water conservation.

(J) New commercial and industrial water use review.

(K) Conservation pricing for water service and conservation pricing for sewer service, where the urban water supplier also provides sewer service.

(L) Landscape water conservation for new and existing single-family homes.

(M) Water waste prohibitions.

(N) Water conservation coordinator.

(O) Financial incentives to encourage water conservation.

(P) Ultra-low-flush toilet replacement.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of such savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, which offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and non-economic factors, including environmental, social, health, customer impact, and technological factors.
(2) Include a cost-benefit analysis, identifying total benefits and total costs.
(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.
(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to the council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.

(e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems and to promote recirculating uses.

Article 2.5 Water Service Reliability

10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies within 60 days of the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any future, potential customers.

Article 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall file with the department a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be filed with the department within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive drought assistance from the state until the urban water management plan is submitted pursuant to Article 3 (commencing with Section 10640) of Chapter 3.

SEC. 2. No appropriation is made and no reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution or Section 2231 or 2234 of the Revenue and Taxation Code because the local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act.

Appendix B
Water Planning and Management Activities

This appendix describes the projects, programs and analyses the District undertakes to meet its water supply goals.

A. Overall Resource Planning and Management

District programs in the areas of water supply planning, business planning, stream management, government relations, and public information support the overall operations and management of the District. These programs are described below.

1. Long-Term Water Supply Planning

If Santa Clara County enjoyed only average to wet years from now to the year 2020, current water supplies could probably meet demand--even with projected growth in the County's economy and population. However, District projections indicate that in future severe droughts, the County could experience a significant water supply shortfall. The District is undertaking several efforts to address this potential water supply gap.

a. Integrated Water Resources Plan (IWRP)

In March 1996 the District launched the IWRP. Working closely with members of the general public, community, business and environmental groups, cities and other agencies, the District developed a preferred strategy for meeting water supply needs through year 2020. The District's Board accepted this strategy on December 10, 1996.

The IWRP is both a conceptual master plan and an ongoing monitoring and update process. The preferred strategy includes programs based on four primary components: water banking, water transfers, water recycling, and water conservation. These programs, which are already under way, will be fully phased into operation in response to water supplies and demand.

b. Statistical Analysis of IWRP Preferred Strategy

To assess the risk of shortage that will remain even after the preferred strategy has been implemented, an additional analysis was performed. The historical record was randomly sampled to generate a trace of 100,000 years of water supply data.

This analysis showed that the IWRP Preferred Strategy is effective in meeting water demands during long drought events (7 or more below-average years), such as the 10-year CDP design event used in the IWRP. Very severe short events can result in significant water shortage, however. The report recommended further investigating management strategies for responding to such events. The Drought Management Plan was developed in response to that recommendation.

c. Drought Management Plan

The Drought Management Plan describes actions and policies that can be enacted in preparation for and during droughts to best meet District goals. These actions and policies are intended to minimize the frequency and magnitude of drought response (whether that be customer cutbacks or additional water supply purchases) while avoiding possible land subsidence due to over-extraction of groundwater storage. The actions developed in the Drought Management Plan are described in Chapter 7.

d. Update of the Water Demand Range for Planning

One key aspect of the IWRP was the decision to design water management strategies that were flexible and adaptive, in recognition of the uncertain nature of future demand and supply. The IWRP used a demand range for planning, designed to encompass a variety of water demand scenarios that may occur. The demand range was developed in the early 1990s, when the County was still experiencing the impacts of a long drought and a significant economic recession. Due to the uncertainty of the long-term impacts of these events on water demand, the demand range that was derived was quite broad.

The demand range for planning was recently updated, using more current water use and demographic projections and more sophisticated analyses than the previous IWRP range. The current demand range for planning is presented in detail in Chapter 4.

e. Operational Storage Analysis

The Santa Clara Valley Subbasin historically has supplied approximately half of the total water use in the North County. The operational storage of a groundwater basin is defined as the amount of storage that can be used without risking land subsidence. The operational storage capacity of this subbasin was previously estimated at 250,000 af.

The Operational Storage Analysis used more sophisticated groundwater modeling and system simulation modeling techniques to reevaluate operational storage, and found the following:

- Operational groundwater storage capacity is not a single number, but rather depends on how a basin is operated. With 2020 demands and IWRP actions in place, the operational storage is estimated as 350,000 af.
- The rate of withdrawal from the subbasin is a controlling function and pumping should not exceed 200,000 af/year. Current subbasin operation does not exceed that limit.
- The west side of this subbasin is operationally sensitive, requiring the Rinconada WTP to maintain the highest priority when supplies become short if subsidence is to be avoided.

2. Business Planning

Although the District is a public agency, business planning efforts recognize the need to manage its functions using a business-like approach.

a. 1999 Business Plan

In 1999, the District developed its first formal Business Plan for the Water Utility. The purpose of the Business Plan is to define a business strategy framework that embraces the Board's strategic goals and objectives, as described in Chapter 2. The Business Plan assess the District's position in the local, state and federal setting, as well as in California's statewide water marketplace. The identification of outcomes within the Business Plan communicates to District customers how the District intends to pursue the Board's goals and objectives and meet customer needs, and discusses such important aspects as the District's marketplace, customer service, business strategy, level of service and cost of service.

b. Water Utility Enterprise Report

In addition to the Business Plan, the District Act requires an annual Water Utility Enterprise Report that supports the annual rate-setting process. The report provides information on the present and future water requirements of the County, the water supply available to the District, future requirements for capital improvements and operations and maintenance, financing methods and financial outlook, and the recommended water charges by zone for agricultural water and non-agricultural water for the upcoming fiscal year.

3. Stream Management

The District has initiated a stream management approach to manage its activities in and near streams as a responsible steward of watersheds and riparian corridors and in compliance with regulatory mandates. The District is currently developing a multi-species Habitat Conservation Plan that will address water supply facilities and operations and how to avoid or minimize environmental impacts to threatened or endangered species.

a. Fisheries and Aquatic Habitat Collaborative Effort (FAHCE)

As the water management agency in Santa Clara County, the District plays a key role in balancing the water needs of a growing economy and those of the environment. For example, to address water rights complaints filed with the State Water Resources Control Board, the District initiated the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). This effort includes studying the aquatic habitats in our managed streams, and the impacts on them from District operations.

b. Fish Passage Projects

As described in Chapter 3, the District uses the County's waterways to transport water to recharge facilities and for recharge in streambeds. The District has undertaken several projects to improve conditions for anadromous fish in these facilities. For example, in 1999 the District constructed a fish ladder and fish screen at the Blossom Hill drop structure on the Guadalupe River. The fish ladder at Blossom Hill, in combination with the removal in 1998 of two barriers that impede the upstream passage of salmon, provides access to 19 miles of spawning habitat. Additional fish ladders and screens are planned for Masson Dam, Penitencia Creek, and Coyote Percolation Dam.

4. Government Relations

The District's External Communications staff and Government Relations Unit coordinate timely communication and advocacy of the community's water-related interests with the State Legislature, U.S. Congress, state and federal regulatory agencies, and local governments. This unit increases recognition of the District at all legislative levels; builds legislative support for District programs and policies; and develops timely public policy analyses and responses to local issues affecting the District, its retail customers, and local business, community and minority groups.

5. Public Information Activities

Public information programs are designed to inform and educate residents about key water quality and water supply issues that affect the District's operations and planning. The Public Information Office prepares news releases on current events and prepares newsletters and brochures to inform residents of water supply and water quality issues. The water education program provides hands-on instruction and curriculum materials for pre-kindergarten through college level students and educators. Public education is a key component of the District's water conservation and resource protection programs, helping to ensure safe and reliable future supplies. The District's public information efforts relative to water conservation are further described in Chapter 11.

B. Monitoring Programs

The District has a number of programs that monitor the conditions of the groundwater, surface water and water use within the County, as described below.

1. Hydrologic Data

The District operates, maintains, and calibrates an extensive network of hydrologic measuring stations within Santa Clara County. The network currently includes 54 streamflow stations, 11 reservoir stations, 40 rainfall stations, and 1 evaporation station. Data collection methods include either radio transmission or monthly site retrieval of a data module. Hydrologic data provided by this network support a variety of District activities including:

- Determination of local natural runoff contribution to raw water operations system.
- Groundwater recharge program.
- Engineering hydrology and flood management.
- Water rights licensing and permitting.
- Raw water operations.
- Environmental regulation.
- Flood emergency operations.
- Water balance determination.

A great deal of effort goes into the collection of hydrologic data. To compliment this effort, a hydrologic database (HDB) has been developed for easy access and dissemination of large quantities of hydrologic data. Currently, efforts are being made to complete data analysis and to bring data availability on the HDB up to date.

This information, together with metered data from the District's raw water distribution system, is used to estimate surface water distribution, the runoff from the local watersheds, and the quantities of local and imported water recharged to the groundwater basin. Evaporation losses from all reservoirs are calculated monthly. This analysis is used as part of water rights, dam licensing, and contractual reporting requirements.

2. Groundwater Elevations

The groundwater level monitoring program provides accurate and dependable depth-to-water field measurements for the three major groundwater subbasins in the County through the following activities:

- Performing monthly depth-to-water field measurements from 56 wells.
- Performing quarterly depth-to-water field measurements from 132 wells.
- Obtaining depth-to-water information on 184 wells from other agencies.
- Maintaining a database of depth-to-water measurements.
- Preparing semi-annual groundwater level contour maps.

The existing groundwater level monitoring program is currently being updated to enhance the network's geographical coverage and monitor the individual piezometric pressures within the three-dimensional groundwater system. A new groundwater elevation monitoring network has been designed for the Santa Clara Valley subbasin and is scheduled to be implemented in the next two years. Another project will be undertaken to develop a new monitoring network for the Coyote and Llagas subbasins.

3. Groundwater Quality

The General Groundwater Quality Monitoring Program determines the general water quality conditions of the groundwater resources in Santa Clara County. The following tasks are completed every other year:

- Collecting water quality samples from a monitoring network of approximately 60 wells.
- Analyzing the samples for general minerals, trace metals, and physical characteristics.

- Evaluating the analytical results, updating the database, and performing water quality computations and statistical analyses.

- Preparing a summary report describing the water quality of the groundwater resources in the County.

Additional wells will be installed in those areas with sparse coverage in the near future. The District continues to assess and provide recommendations to address any adverse quality trends that are observed through the General Groundwater Quality Monitoring Program. In addition, special studies for specific contaminants, such as the MTBE program described below, are conducted as the need arises.

4. Land Subsidence

Prior to the importation and artificial recharge of water from the SWP in 1965, groundwater in the Santa Clara Valley Subbasin was being seriously overdrafted. Land surface subsidence, up to 13 feet in some areas of downtown San Jose, caused an enormous amount of damage associated with flood protection facilities, drainage facilities, collapsed wells, and changes in the grade of pipelines, streets and highways. A combination of factors including imported water, natural recharge, decreased pumping due to treated water availability, and increased artificial recharge has kept land subsidence to less than 0.10 feet per year since the early 1970s and averaging 0.01 feet per year between 1980 and 1990.

The District relies on two extensometer sites in San Jose and Sunnyvale to measure the rate and magnitude of compaction that occurs between the land surface and the bottom of 1000-foot wells. These sites have recently been upgraded and equipped with monitoring, storage, and transmission instrumentation to execute the data acquisition process electronically. This data is analyzed to determine any changes in the rate of land subsidence.

Since the 1960s, the District has surveyed a cross-valley level circuit to evaluate the magnitude and extent of subsidence. A second leveling was added in 1998. These leveling surveys continue to be conducted annually to measure any land subsidence that may be occurring elsewhere than the extensometer sites.

In 1998, the District entered into a cooperative agreement with the United States Geological Survey (USGS) to use Interferometric Synthetic Aperture Radar (INSAR) technology to measure any land subsidence that may not have been captured in the existing monitoring program. This new technology compares satellite images taken at different times to reveal any changes in ground surface elevations with an accuracy of a few millimeters. INSAR covers the entire area of the valley (compared to the traditional monitoring that is site-specific). If INSAR technology is able to replicate historical subsidence data, it will be incorporated into the existing monitoring system and used to identify locations where new extensometers may be useful in the system.

The District has developed a subsidence-threshold numerical model that relates the expected rate of land subsidence from various groundwater elevations. The District is also investigating incorporating the USGS subsidence package into the District's groundwater model.

5. Metering

District Ordinance 70-1 and Resolution 91-53 specify that wells that produce over a certain quantity of water be metered if it is cost-effective to do so. In the northern portion of the County (Zone W-2), the minimum production levels to qualify a well for metering are 4 af or more of agricultural water or 1 af or more of non-agricultural water. In the southern portion of the County (Zone W-5), the minimum production levels are 20 af or more of agricultural water or 2 af or more of non-agricultural water. All wells that meet the production criteria and a cost feasibility analysis are metered, and the water use from unmetered wells is estimated using crop factors or average household values. A groundwater charge based on volume of use is paid for all groundwater pumped. All treated water and raw surface water delivered is also metered and charged based on volume.

The District operates a facility for the testing and overhauling of both groundwater and surface water production meters. Meters are tested regularly using standard testing procedures and guidelines established by the American Water Works Association. When problems are discovered, meters are repaired (in place when possible) or replaced. Meters are also replaced on a regular schedule for testing and rebuilding.

The District also performs volumetric testing on the retail water agencies' well production meters. These meters are used to report production to the District.

6. Major Retailer Water Supply and Use

The Water Supply and Use Report was first published in 1989 as the Drought Status Report, summarizing the monthly water use of the County's major water retailers in response to water use restrictions imposed during the 1987-1992 drought. The report now includes local rainfall and reservoir storage, imported water supply and use, recycled water use, groundwater index well measurements, and water use of the major retailers.

7. Retailer Water Use by Customer Classification

As a water wholesaler, the District data on water use patterns is limited. The District sells primarily to major water systems, and is not able to track water use by customer classification (residential, industrial, commercial, etc.) without information from the County's water retailers. The District collects monthly data on water use by customer class from the major retailers in order to understand changes in water use patterns by sector. This information is useful for water conservation program planning and for the water demand projections necessary for water supply planning. Enhancements now under way for the District's Monitoring and Evaluation Program are expected to improve the collection of retailer use-by-class data.

C. Supply Management and Augmentation

As described in Chapter 3, to ensure the availability of water to 15 cities spread over 1,300 square miles, the District operates the following facilities: 10 surface reservoirs with a capacity of 169,000 af; 17 miles of canals; 393 acres of recharge ponds; 142 miles of pipelines; 3 water treatment plants; and 3 pump stations.   The District also has long-term agreements to purchase water to augment local supplies through the CVP and SWP facilities, supports the development of recycled water within the County, and promotes water conservation in homes, business and agriculture. The principle activities of the District in managing and augmenting its water supplies are described below.

1. Groundwater Basin Management

The groundwater basin is a key element of the District's water supply and the District has several ongoing programs to manage it.

a. In-Stream and Off-Stream Recharge

Approximately 90 miles of stream channel in the alluvial plain recharge the groundwater subbasins. All of the streams are ephemeral. When the natural flow subsides, the District may release water conserved in its 10 local reservoirs or imported water for artificial instream recharge. Temporary and permanent dams are constructed within many streambeds to increase recharge rates. Spreader dams have been constructed at 60 or more sites since they were first employed in the 1920s. In addition, 83 off-stream recharge ponds for a total of about 350 acres of surface area are used to recharge both local and imported water into the aquifer. These facilities must be maintained and periodically cleaned to retain their recharge capacity.

b. Injection Wells

The District has completed the feasibility testing of a direct injection facility, with a capacity of 700 to 1000 af/year. The injection well will be supplied with water treated at the Rinconada Water Treatment Plant via the West Pipeline, Santa Clara Distributary Pipeline, and the Campbell Distributary Pipeline. If injection wells are demonstrated to be effective, similar facilities may be constructed to meet future recharge needs.

c. Treated Water Pricing for Groundwater Basin Management

In addition to the direct recharge programs, the District also prices treated water to encourage the use of treated water over groundwater pumping. When additional treated water capacity is available and groundwater levels remain below the operational storage limit, treated water above the contracted requirements may be sold to retailers at a reduced price. For example, in the past few years the Board has lowered the surcharge on treated water provided in excess of scheduled contract amounts at the Rinconada WTP to create an incentive to use treated water in lieu of well water on the west side of the Santa Clara Valley subbasin.

2. Surface Water Management

The reliability of surface water supplies depends on both the availability of the water itself as well as the reliability and integrity of the infrastructure and systems that transport and store it. Thus, all activities related to operating and maintaining the District's dams reservoirs, canals, and pipelines are directly related to providing water supply.

a. Raw Water Operations

The District operates and maintains a countywide conservation and distribution system. The 10 local reservoirs are operated to conserve wet weather flows for either recharge into the groundwater basin or treatment at one of the three water treatment plants later in the year.

Daily operations are monitored 24 hours per day by operators using the computerized raw water control system, and in the field by technicians. The raw water control system provides for remote operation of water distribution facilities and real-time system performance data. Operations technicians perform daily inspection of recharge facilities and record flows and water levels. Adjustments are made in the field in accordance with the current operations plan.

b. Water Balance

A monthly water balance is performed to reconcile all measured water imports, inflows, releases, and changes in storage. The results of this balance become the final accounting for distribution and facility processing. The data is used for water rights reporting, accounting for usage of federal CVP water and for facility performance measurement.

c. Seismic and Capital Improvement Projects

District facilities are subject to regulation regarding seismic performance of dams, reservoir landslide monitoring and evaluation, and periodic field inspections. Consequently, maintenance activities include continuing liaison and data exchange with the State Division of Safety of Dams and the Federal Energy Regulatory Commission.

Capital improvement projects in progress include the upgrade of the Raw Water Control System, the repair of the landslide on the Santa Clara Tunnel, Lenihan Dam outlet pipe modifications, and replacement of geotechnical monitoring instruments at Almaden Dam and Lenihan Dam.

3. Imported Water

Maintaining reliable access to high-quality supplies of imported water is essential to meeting the current and future water needs of the County. The District devotes considerable effort to secure reliable supplies of imported water through its contracts with the SWP and CVP, and water transfer and water banking agreements.

a. Resolution of Bay-Delta Issues: CALFED Bay-Delta Program

The future of the District's drinking water supplies depends in part on the health of an ecosystem that is miles away from this County: the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary (Bay-Delta). The Bay-Delta is an intricate web of waterways at the junction of the San Francisco Bay and the Sacramento and San Joaquin rivers. It is home to the largest estuary on the west coasts of North and South America. The state and federal facilities that move water through the Delta supply drinking water for more than 22 million Californians and provide a source of irrigation water for California's $24 billion farm industry.

The District imports water through the Delta under contracts with the State Water Project and the Federal CVP. However, decades of environmental neglect threaten the health of this fragile ecosystem, and have contributed to a decline in its water quality. Competing demands on a limited resource led to decades of conflicts and uncertainties in this imported supply. Furthermore, the vulnerability of delta levees to seismic and flooding failures threatens both the infrastructure and the quality of California's water supply.

The District plays an active role in resolving these Bay-Delta issues, improving source water quality, and strengthening the agreements among state and federal agencies and various water users to increase overall reliability of supply. We do this by actively participating in the state/federal/public CALFED process and other related processes. Since the signing of the Bay-Delta Accord in December 1994, a coalition of state and federal agencies has worked to develop a long-term "fix" for problems in the Bay-Delta. The coalition, known as the CALFED Bay-Delta Program, has been developing a plan for resolving Bay-Delta issues in cooperation with environmental, business, urban, and agricultural interests. The District is actively involved in the development and evaluation of this program because of the importance of the outcome on the reliability and quality of the District's imported water supplies.

After 5 years of planning, development and review, CALFED released a document titled: California's Water Future: A Framework for Action in June 2000. This "Framework" document outlines a specific set of actions to be implemented in the next 7 years as part of the overall vision to create a balanced solution. In July 2000, the CALFED Bay-Delta Program released its Final Programmatic EIR/EIS (FPEIR/S). In August 2000, CALFED adopted a Record of

Decision and Certification on the FPEIR/S.

Both the “Framework” and the FPEIR/S contain solution elements that would ultimately provide improvements to the District’s water supply reliability and source water quality. For instance, the District is due to receive Proposition 13 funds to begin a feasibility study on the San Luis Bypass/Pacheco Reservoir enlargement. Although many aspects of the Framework and FPEIR/S require further development and refinement, a successful Bay-Delta resolution is absolutely essential to address California’s water problems and to maintain the public welfare and the economic viability of the state.

b. CVPIA

In 1992, the federal Central Valley Project Improvement Act (CVPIA) mandated sweeping changes to the operations and management of the Central Valley Project (CVP). These included the dedication of 800,000 af of CVP yield to restoration of anadromous fish and other environmental purposes, and increases in supplies to wildlife refugees, which have reduced the CVP supply available for contractors. In 2000, the U.S. Bureau of Reclamation completed a Programmatic Environmental Impact Statement on the CVPIA that shows substantial impacts to the reliability of the District’s CVP supplies. District staff is working with Reclamation and other stakeholders to find ways to minimize water supply impacts, and identify projects to restore CVP yield, as directed by the CVPIA.

c. Water Banking and Exchanges

The IWRP identified banking of excess supplies in wet years as a central element in the preferred strategy for providing reliable water supply needed in future dry years. The District has a current water banking agreement to store up to 350,000 af of water with the Semitropic Water Storage District and a yearly exchange agreement with San Benito County typically amounting to 16,000 af of CVP water. In addition, the District has stored some CVP water in San Benito County’s San Justo Reservoir. To further increase reliability, the District initiated a Water Reallocation Agreement with Westlands Water District and the San Luis Water District to supplement District supplies when CVP entitlements are less than 75 percent. Further information on the District’s water banking and transfer programs is in chapters 9 and 10.

4. Water Recycling

Recycled water was identified in the IWRP as one element of the preferred strategy. The District works in partnership with the cities and wastewater treatment agencies that develop and distribute recycled water by contributing financial and technical support and acting as liaison with the water retailers. In addition, the District is partnering with the South County Regional Wastewater Authority to restore and improve the existing recycled water pipeline in Gilroy. Recycled water activities are discussed in greater detail in Chapter 8.

5. Conservation

Water conservation is a key component of the preferred strategy. Demand-side management programs reduce current and future water demand, thus improving water supply reliability and reducing water shortages in the future. The District's water conservation program is discussed in greater detail in Chapter 11.

D. Supply Protection

A number of programs provide for the protection of the District resources, including surface waters, the groundwater basins, and the treated water delivered to District retailers.

1. Watershed Management

The District recognizes the importance of maintaining a healthy local ecosystem while balancing the water supply, flood protection and recreation needs of the communities it serves.

a. Comprehensive Reservoir Watershed Management Project

The goal of the Comprehensive Reservoir Watershed Management Project (CRWMP) is to develop a multi-barrier approach to protect the water quality and supply reliability of the District's reservoirs while balancing competing objectives such as recreational uses and the rights of private property owners. Goals include preserving the operational flexibility of the reservoirs; improving water quality by minimizing contamination, disinfection byproduct precursors, and algal blooms that can lead to taste and odor problems; and minimizing sediment loading to preserve both water quality and reservoir capacity.

The project includes several complex tasks, including developing watershed evaluation methods, developing the geographical information system required to conduct watershed evaluations, identifying and gathering the data needed for watershed evaluations, and developing recommended management measures for meeting the project goals. Another critical component of CRWMP is the public outreach effort involving all the stakeholders in the reservoir watersheds. Staff is currently preparing a watershed assessment report documenting the current environmental conditions of each reservoir watershed, existing and potential water quality threats, and historic water quality results. Mitigation strategies will be selected in a process that includes all interested affected parties.

b. Watershed Management Initiative (WMI)

The District is also one of the many stakeholders participating in the Watershed Management Initiative (WMI), which is intended to protect and enhance the Santa Clara Subbasin watershed and balance the objectives of water supply management, habitat protection, flood management, and land use. The WMI members are currently developing a watershed assessment to document the basin's environmental conditions and regulatory framework, scheduled to be completed in 2000. Upon completion of the watershed assessment, a State of the Watershed Report will be prepared that describes what can be done to meet the watershed goals, and, finally, a Watershed Management Plan will be developed.

2. Land Development Review/Ordinance 83-2 Enforcement

The Land Development Review Program evaluates the land use and developments occurring within the County and identifies any adverse impacts to District facilities and the watercourses under District jurisdiction.

The District reviews and comments on proposed land development, environmental documents, and City and County general plans. Review of land development proposals includes a determination of direct and indirect impacts to District facilities, such as increased runoff and flooding due to new impervious surfaces, or introduction of pollution to a watercourse due to construction activities or urban runoff. Direct impacts are addressed through the District's permitting program as defined by District Ordinance 83-2 for construction within or adjacent to a watercourse under District jurisdiction.

The District does not have authority to control land use development. However, the District is working toward greater involvement in land use planning efforts, such as joining interagency project teams, participating in general plan review and revision, and helping to develop relevant policies (such as riparian corridor and building setback policies). Revisions to District ordinances and increased involvement in educating land development planning staff are other possible avenues in this area.

3. Urban Runoff Program

The District works to improve the quality of storm water runoff through its membership in the Santa Clara Valley Urban Runoff Management Program. The District participates in this program as one of 15 co-permittees under a single Clean Water Act permit from the Regional Water Quality Control Board. Permit requirements and consequent compliance projects fall into two categories: area-wide and agency-specific.

Area-wide projects are implemented without regard to the jurisdictional boundaries of the individual co-permittees. They include monitoring projects to characterize representative drainage areas, assess adverse impacts on beneficial uses, identify pollutant sources, and evaluate the effectiveness of control measures. Area-wide projects also include public information and participation efforts such as outreach to the general public, information and education to targeted commercial activities, and training of municipal employees.

Agency-specific projects are the sole responsibility of each agency to implement within its own jurisdiction. District-specific non-point source pollution prevention programs include the following:

- Storm Water Pollution Prevention Plans or Best Management Practice (BMP) Implementation Plans for District capital improvement projects.

- Permit conditions and inter-agency permitting protocols, and site inspection activities that promote the use of BMPs for construction and post-construction activities for community developments within 50 feet of the top of bank of watercourses.

- Illicit connection and illegal discharge elimination.

- Comprehensive pollution prevention guidance manual for District water conveyance and treatment facilities.

- Storm Water Pollution Prevention Plans for District facilities and storage yards.

- Development of a guidance manual to integrate the BMPs into the channel maintenance standard operating procedures.

4. Well and Wellhead Protection Programs

A variety of District programs help protect groundwater resources that are accessed by wells.

a. Groundwater Assessment and Protection

The objective of the Groundwater Assessment and Protection Program is to prevent and mitigate potential contamination leaking into the County's groundwater basins by delineating sensitive and vulnerable areas of the basin; identifying potential and existing sources of contamination; making recommendations on management strategies to eliminate or reduce the risks to groundwater resources from contaminants in the sensitive areas; and implementing management strategies where it is appropriate to do so.

The District has identified and mapped many of the potential sources of contamination throughout the County, including leaking underground storage tanks, operating gas tanks, and known solvent spill sites. The District is in the process of mapping dry cleaners, hazardous materials storage facilities, septic system locations, and sewer lines. In addition, mapping coverages have been created that describe depth-to-water, net recharge, aquifer media, soil media, topography, and hydraulic conductivity of the aquifer.

The District is also working with local water retailers on the state's Drinking Water Source Assessment and Protection Program. This program delineates the protection areas, inventories the possible contamination sources, and analyzes the vulnerability of all large public water supply wells.

b. Well Ordinance

The District has the authority to require owners to upgrade or seal and destroy wells determined to be a public nuisance. The Well Ordinance Program protects the County's groundwater resources by regulating all activities relating to the construction, modification, maintenance, or destruction of wells in the County to ensure that these wells do not allow the transport of poorer quality water or contaminants into the drinking water aquifers. The District permits and inspects well construction and destruction in the County to enforce the District's Well Standards. In addition, a database and mapping system is maintained that documents well location, permit status, and construction and destruction details.

c. Abandoned Well Destruction Assistance

As mentioned above, the District can order property owners to properly destroy abandoned wells under the Well Ordinance Program, at an expense to the property owner of $3,000 to $15,000. In 1994 the District initiated the Abandoned Well Destruction Assistance Program to aid property owners who happen to discover an abandoned water supply well on their property. The District destroys abandoned water wells if the property owner had no previous knowledge of the well, the well was not registered with the District, the well has no surface features that would have indicated its presence, and the property owner enters into a Right of Entry Agreement with the District. Most of the wells destroyed under this program were first discovered and reported to the District when they started flowing under artesian pressure.

d. Dry Well Program

Dry wells, also known as storm water infiltration devices, direct surface runoff into the ground. Unfortunately, storm water runoff can carry pollution from the surface into groundwater. Dry wells introduce the storm water directly into the ground, bypassing the natural processes of pollution breakdown that occur with natural infiltration, and thus increasing the chance for groundwater contamination. In addition, dry wells have been sites of illegal dumping of pollutants.

Since 1993, owners of dry wells greater than 10 feet deep have been required to register their wells with the District. The District recently changed its policy to prohibit dry wells greater than 10 feet in depth. District staff advises the public and planning agencies about the appropriate use of dry wells and their risk to groundwater quality. The program aims to control the installation of new dry wells and destroy existing dry wells that have or may contaminate the groundwater basin.

5. Leaking Underground Storage Tank Oversight Program

The objective of this program is to protect the County's groundwater basins from water quality degradation as a result of releases of contaminants from underground storage tanks (USTs). The removal and replacement of USTs, leak prevention, and monitoring activities are overseen by one of the ten other agencies within the County. If there is evidence of a leak or if contamination is detected, the District is notified. The District then provides regulatory oversight of the investigation and cleanup of contamination in accordance with the District's Local Oversight Program with the State Water Resources Control Board. The District works closely with the staff of the Central Coast and the San Francisco Regional Boards in providing this oversight and requests their assistance when necessary for enforcement. When investigation and cleanup has been completed, the responsible party (UST owner, operator, and property owner) provides evidence that the release does not pose a significant threat to human health and safety, the environment, or water resources. At that point the case receives closure from the District.

Over 2,275 releases of petroleum hydrocarbons have been reported in the County. Approximately 69 percent (1,570) of these cases have received regulatory closure. Many of the remaining cases involve the gasoline additive MTBE, some at very high concentrations. The District has made significant progress in getting responsible parties to properly investigate and clean-up MTBE and other contaminants.

6. Nitrate Management

The nitrate management program aims to delineate, track, and manage nitrate contamination in the groundwater basins of the South County in order to ensure the basins’ viability as a long-term potable water supply. The objectives include reducing the public’s exposure to high nitrate concentrations, reducing further loading of nitrate, and monitoring the occurrence of nitrate.

Studies of the Llagas and Coyote Subbasins have found that there are many sources of nitrate loading impacting groundwater quality in the area, including fertilizer application and animal and human waste generation. A large agricultural outreach effort offers free irrigation evaluations to farmers to reduce the amount of water and nitrate leached beyond the active root zone of the crops. The District cosponsors several seminars each year on nutrient, irrigation, and pesticide management to educate growers and provide practical tools they can use on their own. Free nitrate analysis has been offered to all well water users in the Llagas and Coyote Subbasins, and over 600 wells have been tested for nitrate.

A network of 27 deep groundwater wells and 18 shallow monitoring wells is monitored quarterly to track seasonal, areal, vertical and long-term trends in nitrate concentrations. Depending on the monitoring results, more extensive action to remediate nitrates may be required.

7. MTBE

A recently identified new threat to drinking water is the gasoline additive MTBE. Traces of the additive have been found in District reservoirs, a municipal water supply well in the county, and groundwater at over 400 leaking UST sites. The District, in partnership with the County's water retailers, has engaged in an aggressive monitoring program to track the presence of MTBE that may affect water supplies. This includes sampling more than 100 wells on a regular basis, collecting monitoring data from retailers, and testing private wells located near UWT sites with MTBE in groundwater.

The District is continuing to work toward preventing more of the contaminant from entering the water supply and is working through its Government Relations Office to support legislation to restrict the use of MTBE as a gasoline additive. In cooperation with the Santa Clara County Parks and Recreation Department, the District is requiring the use of gasoline produced without MTBE in watercraft used on District reservoirs. In the event that this program is not effective, the District will reimpose restrictions on the number of watercraft that may use the reservoirs.

The District also completed two studies to determine if MTBE releases are occurring at sites that comply with new standards for underground storage tanks. The results of these studies indicate that releases from these tank systems can occur and go undetected. The District is working with the Regional Water Quality Control Boards to require sampling for MTBE at these facilities.

The District's leaking UST oversight program helps ensure that MTBE in groundwater at leaking UST sites is adequately cleaned up to protect water resources, the environment, and human health.

8. Hazardous Materials Management

To prevent contamination of the County's water supplies from hazardous materials, the District manages the investigation, analysis, removal, and disposal of suspected or known hazardous materials dumped or spilled in the vicinity of source areas such as reservoirs, recharge ponds and creeks.

9. Water Treatment Improvements

a. Partnership for Safe Water

The District was among the first water utilities nationwide to join the Partnership for Safe Water in 1995. The Partnership is a voluntary program developed cooperatively by the U.S. EPA, the American Water Works Association, and several other national drinking water industry organizations. The purpose of the program is to further reduce the potential risks to consumers from microbial contaminants like cryptosporidium and giardia. Participation in this program has already yielded impressive results. The District has consistently surpassed the Partnership's goal for filtered water turbidity, a critical indicator of plant performance.

b. Water Treatment Plant Improvements

The District owns and operates three WTPs, which provide high-quality treated water to the residences and businesses in the County. The District is proceeding with process improvements at each of its three treatment plants in response to new federal Safe Drinking Water Act amendments: the enhanced surface water treatment rule and the disinfectant/disinfection by-products rule. The planned changes in the process for water treatment will reduce the incidence of harmful by-products that can occur when surface waters containing organic materials are disinfected. The treatment plant modifications also include structural modifications that will improve treatment plant reliability due to earthquake. In addition, the treatment capacity at Rinconada WTP will be increased to meet projected future demands and the aging facilities at Penitencia WTP will be rehabilitated to be able to meet the new regulatory requirements.

c. Water Quality Laboratory

To complement these new treatment efforts, the District is also planning a new water quality laboratory. This new facility will replace the 30-year-old Rinconada laboratory and will more reliably and cost-effectively monitor the quality of our water supplies.

10. Solvents and Toxics Cleanup Liaison Program

The objective of the program is to protect the groundwater basins from contamination associated with solvents and toxics releases in Santa Clara County. District staff reviews Superfund, solvent and other contamination cases and assists those agencies having regulatory authority over contaminant spills and groundwater cleanups. District staff provides geologic, groundwater use, water quality, and other information, provides comments and recommendations on investigations and remediation proposals and prepares technical reports on those cases. District staff provides expert professional hydrogeologic and engineering data, analysis, and judgment related to the beneficial uses of the groundwater basins and threats posed by contaminated sites.

Appendix C
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